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ABSTRACT

Five presentations are provided. "Technology Teacher Education: A Framework for Program Redesign" (Thomas Erekson, Scott Johnson) discusses the design and development of a technology teacher education program at the University of Illinois with lists of course requirements and illustrations of course sequence. "Teacher Preparation in Industrial Education: Program Proposal from the Faculty in Industrial Education" (David Bjorkquist) proposes a redesign of the program at the University of Minnesota. Outlines are provided of an undergraduate program for a Bachelor of Science in industrial education and an initial licensure program for industrial technology teachers. "The Impact of the Holmes Group Recommendations at Virginia Tech" (William Dugger, James LaPorte) explores the restructuring of the teacher education program, the change process, and the major impacts. "The Impact of the Holmes Group Recommendations on Industrial Teacher Education at Texas A&M University" (Daniel Householder) considers teacher education requirements and guidelines in Texas, program revisions, and the major impacts. "Technology Teacher Education Proposal with Special Consideration for Career Patterns" (Keith Blankenbaker) offers a proposal that attempts to address technology teacher education from the perspective of career patterns and to outline a program consistent with the Holmes Group goals. (YLB)

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Impact of the Holmes Group Recommendations on Industrial Teacher Education

A Symposium Sponsored by the

Industrial Arts Division - American Vocational Association

3:30 - 5:00 p.m.

Saturday, December 3, 1988

Adam's Mark Hotel - Directors Row Room 29

St. Louis, Missouri

Planned and Organized by

Dr. Scott D. Johnson, University of Illinois

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Technology Teacher Education: A Framework for Program Redesign

Thomas L. Erekson and Scott D. Johnson
University of Illinois at Urbana-Champaign

Teacher Education Reform

A call for new directions in teacher education has surfaced as a result of the education reform movement of the 1980s. Several recent proposals have called for revolutionary changes in the way teachers are prepared (Carnegie Forum, 1986; Holmes Group, 1986; ISBE, 1986). While the specific recommendations of each of these proposals varies, one common theme is that more attention must be given to improving the intellectual education of future teachers.

The University of Illinois at Urbana-Champaign (UIUC) has been actively involved in the teacher education reform movement. The University of Illinois was a charter member of the Holmes Group and the Dean of the College of Education has served as a member of the Executive Committee of the Holmes Group. The Holmes Group report, Tomorrow's Teachers, outlines five major goals for the reform of teacher education. The goals are:

1. To make the education of teachers intellectually more solid.

2. To recognize differences in teachers' knowledge, skill, and commitment in their education, certification, and work.

3. To create standards of entry to the profession--examinations and educational requirements--that are professionally relevant and intellectually defensible.

4. To connect our own institutions to schools.

5. To make schools better places for teachers to work, and to learn. (Holmes Group, 1986, p. 4)

The universities which are charter members of the Holmes Group are currently in the process of redesigning their teacher education programs in concert with these goals. Of course, the leaders of the Holmes Group realize that there is no "one best way" to prepare teachers. However, given the goals and general framework, each Holmes Group university is to develop programs that reflect the strengths and unique features of their institutions, programs, and faculty.

Industrial Teacher Education at UIUC

The University of Illinois at Urbana-Champaign has history of leadership in the field of Industrial Education. This leadership has been exhibited through research, graduate education, and the many outstanding industrial education teachers that have been prepared at Illinois.

The Industrial Education program at the University of Illinois has a tradition of being on the cutting edge of the field. For example, Professors Donald Lux and Jacob Stern were key leaders in the Industrial Arts Curriculum Project (IACP) in the 1960s. IACP was an innovative redesign of industrial arts curriculum and instruction at the junior high school level. The curriculum materials and instructional methods of IACP were on the cutting edge of the profession during the 1960s and it received national acclaim. It can be argued that several of the other attempts to reform and revitalize industrial arts curriculum have been based on the Industrial Arts Curriculum Project.

Industrial arts education has historically emphasized the materials and processes of industry through manipulative laboratory activities. However, because of the current transition from an industrial society to an information and technology-based society, echnology has become the major theme in a curriculum renaissance of industrial arts education.

Technology Education

Technology and its innovations are changing the way people work, live, learn, and play. Education for and about technology has become a topic of discussion and debate by educators from various disciplines. In his report, "High School: A Report on Secondary Education in America," Ernest Boyer stated:

> We recommend that all students study technology; the history of man's use of tools, how science and technology have been joined, and the ethical and social issues technology has raised. (p. x)

The State of Illinois has been a leader in the development of technology education curricula. In the early 1980s, a curriculum initiative to design an industrial technology curriculum was funded by the Illinois State Board of Education (ISBE) (see Figure 1). This initiative resulted in the development of conceptual model for curriculum planning called the "Illinois Plan for Industrial Technology Education." The initial focus of this project was to develop a technology-based curriculum at the secondary school level. Courses in areas such as Communication Technology, Transportation Technology, Production Technology, and Energy Utilization Technology were developed, field tested, and disseminated for implementation in schools throughout the state. The "Illinois Plan" has been used as a model by several other states in the reform of their industrial arts curriculum.

A Philosophical Base for Technology Education

The word "technology" is very difficult to define and, as yet, no consensus on a common definition has been established. Technology means different things to different people. To some it means applied science; to others it means gadgets, devices, and machines; still others it means computers.

Rather than develop a technology education program that is based on a narrow view such as those described above, the redesigned Technology Teacher Education program at UIUC has been based on a much broader view of

technology. From a synthesis of the various definitions of technology, faculty and doctoral students at the University of Illinois have developed the following definition to contribute to the philosophical base for the redesign of the technology teacher education program:

> Technology is a synergistic noumenon that occurs through the interaction of knowledge, thinking processes, and the physical actions while attempting to satisfy human wants and needs. (Johnson, 1988, p.x)

A noumenon is an object that is conceived by reason, and consequently thinkable, but not knowable by the senses. Thus, as defined above, technology is something based purely on intellectual intuition. It is not something tangible; you cannot touch it, see it, or smell it. Technology is a noumenon that occurs through the synergistic interaction of knowing, thinking, and doing (see Figure 2).

It is clear that a technology education program requires much more than an emphasis on knowledge as provided by the "academic" subjects and the emphasis on physical skills as provided by "vocational" subjects. Our definition of technology shows that technology education programs must emphasize both knowledge and actions with an extra emphasis placed on thinking skills.

Technological Activity

Because technology, as viewed in this document, exists as a noumenon, there must be something physical that extends human capabilities and leads to the satisfaction of human wants and needs. The physical artifacts commonly thought of as technology are, in fact, the results of technological activity. Technological activity is composed of six distinct components: a) values, b) knowledge, c) thinking processes, d) physical actions, e) extension of human capabilities, and f) impacts (see Figure 3).

Technological activity is a very complex sociotechnical system. As shown in Figure 3, technological activity is driven by human values (wants and needs). To satisfy the wants and needs, physical and mental activity is initiated. The mental activity involves the use of knowledge through various cognitive processes such as planning, problem solving, and decision making. The physical activity involves carrying out the plans that are developed through the thinking processes. This activity involves the use of various resources and techniques. The purpose is to extend the capabilities of humans. This interaction may or may not result in the satisfaction of the wants and needs that began the technological activity. If the wants and needs are not satisfied, further technological activity may be needed.

The technological activity model does not end with the satisfaction of human wants and needs through the extension of human capabilities. Both positive and negative impacts (e.g., social, environmental, political, financial, educational) result from technological activity. These impacts affect the values and philosophies which determine wants and needs; which result in the identification of new needs, wants, and intentions which lead to further technological activity.

Any teacher education program that is developed to prepare teachers to teach technology must address all aspects of the Interactive Model of Technological Activity. Technology-based curricula must include the study of human values and philosophies that drive technological activity; the study of the interactions of knowledge, thinking skills, and physical actions that occur through an attempt to extend capabilities to satisfy human wants and needs; and the study of the impacts that result from technological activity.

Technology Teacher Education Program

The development of a technology teacher education program at the University of Illinois has included several major activities. These activities were undertaken to develop a research base from which a redesigned teacher education program could be formulated. As a result, the first draft of the technology teacher education redesign proposal was prepared in October of 1987. That document was circulated on campus and off campus for review and comment by experts in teacher education and technology education. Comments were received, reviewed and incorporated into this document.

Technology education faculty and graduate students established the following baseline premises for the redesign of the teacher education program.

(1) Technology is a discipline with its unique body of knowledge and conceptual structure that should be included in all comprehensive secondary education programs in the United States. Therefore, there will be a need for qualified technology teachers to fill these positions.

(2) The changes needed in programs to prepare technology teachers are so great that the program must be completely redesigned rather than merely attempt to tinker with mild reforms.

(3) With the exponential growth of technology, it is highly unlikely that a technology teacher can be prepared with sufficient breadth and depth through a four-year baccalaureate degree program. Thus, a five- to six-year program is more appropriate for the preparation of technology teachers.

(4) Technology teachers need to have a rigorous, academic teaching minor that enhances the technology major and provides support for the interdisciplinary study of technology.

(5) Education should mirror life, thus it is imperative that technology teachers have internship activities in technological occupations.

(6) To assist in the transition from traditional industrial arts to technology education, the program to prepare technology teachers must establish partnerships with schools to facilitate the curriculum transition process while involving prospective technology teachers in actual school settings.

The proposed framework for a program to prepare technology teachers includes six major components. These major components are a) general education, b) the technology sequence, c) the minor, d) the professional education sequence, e) clinical experiences, and f) the university coordinated experiences. These are not discrete components which independently support the program. Rather, the content and experience of the six components are designed to provide an integration of liberal education, technology studies, professional education, and clinical experiences for the preparation of qualified, competent technology teachers. Each of these components addresses one or more of the aspects of the Interactive Model of Technological Activity.

The components of the Technology Teacher Education program are presented in Figure 4. The following paragraphs briefly describe each of the components of the program.

Component 1--General Education

The general education component is designed to fulfill three major objectives. First, this component will provide students with a strong liberal education. Second, the general education courses have been selected to provide students with a solid foundation upon which the remainder of the program can be built. In effect, the specific general education course work develops the values and philosophy base for the study of technology. To achieve this goal, the recommended courses were selected to provide students with the broad conceptual knowledge needed to understand technology and society. Third, the general education component was developed to meet or exceed the newly revised State of Illinois teacher certification requirements for general education.

The courses in the general education component is prescribed in detail, with few free electives. This level of specificity is proposed because general education should not become a collection of courses that students select cafeteria style. Each course proposed in this component has been selected to contribute to an interdisciplinary liberal education base for a technology teacher while at the same time providing a strong educational background regardless of the students' occupational futures. The specific course requirements being proposed are included in Appendix A.

Component 2--Technology Sequence

The technology sequence component comprises the coursework for the major. Because technology is viewed as a unique discipline, the proposed sequence is presented to construct a systematic approach to organizing a major for its study. This component is divided into three major sections; technological literacy, technology specialization, and technology synthesis. The intention of this sequence is to construct a systematic and educationally sound approach to the study of technology. Each of these components is described in the following paragraphs.

Technological Literacy. The coursework in the technological literacy section is designed to introduce the students to technology, to provide an overview of the processes of technology, and to build a broad, conceptual

knowledge of technology and its impacts. Four new courses have been developed to accomplish the broad goal of technological literacy. These new courses will replace existing Votec courses in woodworking, drafting, and general shop. It is anticipated that these courses will be cross-listed as Curriculum and Instruction and/or Science/Technology/Society courses. The four technological literacy courses are briefly described below:

Introduction to Technology. This four hour course is designed to provide students with a broad overview of technology and the development of a consumer level of technological literacy. The course will cover a broad range of topics in a hands-on, laboratory setting to include but not be limited to, definitions of technology, technological terminology, the relationship of individuals and society to technology, ethical issues, technological systems and systems theory, and an overview of past, present, and future technological processes. This course will serve as a prerequisite for the three courses that follow.

Technological Systems. This four-hour course will be an indepth study of technological systems. Various types of technological systems will be examined. The components of these systems will be identified and analyzed, particularly as they relate to human endeavors (communication, production, transportation, and energy utilization). Through laboratory experiences, students will participate in the design, development, testing, and modification of technological systems.

Technology Assessment. In this two-hour course, students will be introduced to the concepts of technology assessment, technological forecasting, technological impact, and appropriate technology.

During the laboratory component, students will use a variety of technological forecasting techniques to identify the positive and negative impacts a given technology might have in the future. In addition, students will evaluate an existing technology and develop, present, and defend an appropriate technological solution to a given problem.

Technological Development. This two-hour course is designed to allow students to gain a perspective of how past, present, and future technological developments and innovations effect individuals and society. Through this course, students will develop a broad perspective of how past innovations develop into present technologies and pave the way for future developments. Laboratory work for this course will utilize the anthropological method.

Technology Specialization. The second component of the technology sequence is technology specialization. Technology teachers must be well grounded in the technical aspects of the major (technology) in order to be effective teachers. Therefore, the technology specialization sequence will include 24 hours of approved coursework in one or more of the following technological areas; architecture/construction technology, electronics technology, communication technology, transportation technology, manufacturing technology, industrial technology, and/or design technology. These courses will be offered through various departments at the University of Illinois (e.g., General Engineering, Architecture, Aviation, Ag Mechanics, Ag Communications, Computer Science, Graphic Design, Industrial Design) and through selected programs at Illinois community colleges.

Each student will develop a pattern of technology specialization courses in one or more of the above listed areas with the advice and consent of his/her technology education advisor. The technology specialization courses will then be submitted to the Technology Education Committee for review and approval prior to the student pursuing the courses. Once the sequence is approved, the student will be allowed to progress in the technology specialization area. Sample technology specialization sequence courses are included in Appendix B.

Technology Synthesis. The final aspect of the technology sequence component is technology synthesis. Synthesis will be attained through a four-hour course designed to be the culminating experience for students prior to student teaching. Based on the knowledge and skill each student has developed in technological literacy, specialization, and liberal education, the students will participate in the study of technology through research and development, technological invention, and/or technological enterprise. In effect, the technology synthesis course is intended to be similar to a senior projects class where students synthesize their technological experiences.

In summary, the technology sequence is designed to provide the students with a broad understanding of technology, an indepth skill development component to develop technical skills and knowledge, and a capstone experience to synthesize the knowledge gained in the coursework. This approach is feasible, rigorous, and intellectually defensible.

Component Three--Minor

All students will be required to select a minor that contributes to and enhances the technology education major. Approved minors include Computer Science, Mathematics, Science, Social Studies, or Instructional Applications of Computers. It is realized that some of these minors do not lead to teaching certificates, however they do enhance the technology major. The intent of the minor is not only to enhance the technology sequence but also to add depth to the general education component. In addition, by being certified to teach in more than one area, flexibility for employment is enhanced.

Component Four--Professional Education Sequence

The Professional Education sequence is in the process of being redesigned as a departmental initiative. The result will be a Core Professional Education Sequence for all teachers prepared through departmental programs. The Core Sequence will include course work and/or content in foundations of education, learning theory, school and community relations, computer-based training, curriculum development, instructional methods and technologies, assessment and evaluation, and special needs and adult learners.

The professional education sequence will not only include new emphases, but it will be delivered through new relationships between UIUC and schools. The VOTEC Department will be initiating a University -- Education for Employment Regional System Partnerships. These partnerships will allow for the involvement of master teachers in the Technology Teacher Education program and it will allow UIUC faculty and students to be involved in program transitions as local schools revise traditional industrial arts programs to reflect Technology Education. The intent is to have the focus of the curriculum course (VOTEC 383) be the development of a Technology Education program at a specific school in the partnership, with the approval of the teacher(s), administration, and board. This will develop reality-based program transition skills that UIUC graduates will need as they enter public education.

Component Five--Clinical Experiences

Three types of clinical experiences are planned in the technology Teacher Education program. All students will be required to participate in early field experiences that will allow them to gain experience in the educational environment. The early field experience will comply with the 100 clock hours required by the Illinois State Board of Education prior to student teaching. The intent is to have the students observe and participate in technology education programs in the public schools. Students will also be required to have a semester long, intensive student teaching experience. The student teaching experience will include weekly seminars to enhance the experience.

Each student will also be required to complete six hours of supervised industrial experience in a technological occupation. Cooperative arrangements will be established between the department and selected technological employment locations. The intent is to have these internships be paid, supervised experiences in technology-based industries. Furthermore, these work experiences are intended to be offered during the summers, however, it will be possible for a student to complete the clinical work experience during a fall or spring semester.

Component Six--University Coordinated Experiences

The University of Illinois will be establishing relationships with local schools whereby new teachers are inducted into the field through a one year paid internship. In conjunction with the internship, graduate courses will be offered to facilitate the completion of a Master of Education degree for Technology Education majors.

Recruitment, Admission, and Retention

Students will be recruited for the technology teacher education program from other UIUC colleges (e.g., LAS General, Engineering) and through Illinois community colleges. The community colleges will become network that will assist in identification of students who might have interest in becoming technology teachers. The identified students would be recruited through direct contact from UIUC technology education faculty and through networks that are being developed with current community college faculty. The intention is to admit students as juniors in cohort groups of 15-20. The cohort approach will assist in course scheduling, advisement, and will facilitate the research efforts concerning such variables as demographic background and high school course taking patterns.

A portfolio review will be required for students to continue toward certification. At the beginning of the second semester of the senior year an evaluation team will review each student's portfolio. The review team will be composed of technology education faculty, master technology teachers from public school settings, and public school administrators. The student's portfolio will include a variety of items to be determined by the student. For example, a student might include reports and papers prepared for classes in general education, any inventions, designs, or artwork produced, video tapes of interactions with students, etc. In addition

students will be required to take a written basic skills competency test. The test results, portfolio, and oral presentation will be reviewed by the committee. Only those students who exhibit the appropriate knowledge and ability will be allowed to proceed with teacher certification and the graduate program. Students who are not allowed to proceed in the senior year will complete a baccalaureate degree without teacher certification. The intent of the portfolio review is to add rigor and validity to the review and retention aspects of the program.

Laboratory Instruction

The curriculum renaissance in Industrial Arts Education to reflect Technology Education will not only change the approach of preparing teachers, it will also demand changes in laboratory organization and use for research, teaching, and service. A program in Technology Teacher Education must prepare students to teach technology--not just teach about technology. The revised ISBE certification requirements for Industrial Technology Education require "lab-based" courses as an integral component for certification of a technology teacher. Thus, an effective program to prepare technology teachers will include an integral laboratory component to allow students to experience technology and experiment with the most effective ways to teach it.

The laboratory needed for Technology Teacher Education will permit methods courses to be taught in settings analogous to the real life situations that will be found in the schools of the future. This laboratory must be one that will provide flexibility and facilitate a synthesis of technology experiences. In effect, the laboratory needs to be similar to an applied engineering research and development laboratory. Equipment needs will vary according to the types of courses taught in the lab and the activities being conducted for a specific course. The type of lab that would best accommodate Technology Teacher Education would basically provide an infrastructure of space, power, air, water, exhaust and ventilation, and safety equipment. The specific technical equipment and furnishings would need to be mobile to facilitate rapid changes to simulate different technological activities.

In many instances Technology Education programs have effectively utilized equipment that simulates technological devices (table = top technology). Using table-top technology greatly reduces the cost of lab equipment and it facilitates the flexibility required to adjust with technological changes and research needs.

Degree Program Structure

The intent of this program redesign is to establish an integrated bachelor of science/master of education degree program that leads to teacher certification. The Holmes Group calls for future teachers to have arts and science degrees. Because of the interdisciplinary nature of technology, the most appropriate bachelors degree would be an interdisciplinary arts and science degree. However, as there is no interdisciplinary arts and science degree at UIUC. Therefore, it appears that the bachelor of science degree will be in Technology Education. The masters degree will be a master of education degree in Vocational and Technical Education with a technology education emphasis.

Students will be admitted to a Votec certification program at the beginning of the junior year (after completion of the significant portion of the general education requirements). At the time of admission, the student will become immersed in coursework for the major. While the student is progressing in the major, the professional core of courses and experiences will begin. The balance between the major and the professional core will initially favor the study of the major. As the student progresses into the senior year the balance will begin to shift to the professional core courses. This balance, with its designed shift from subject specialization to professional core, is critical to effective integration and assuring that the student gains a subject-matter orientation to teaching.

With the professional education sequence including several 300 level courses, this program will provide the student with the 300 level Educational Policy Study, Educational Psychology, and Votec courses that are needed for the Master of Education Degree. Completers of the program will need to complete three additional units of 400 level courses to complete the M.Ed. degree. It is the intent to have those three additional 400 level courses be delivered during the one-year paid internship that would be coordinated through the College of Education.

Research Agenda

A major research agenda will be established as a result of this proposed experimental program to prepare technology teachers. The following list identifies potential research projects that could be conducted.

(1) Evaluate the Holmes Group model as applied to Industrial Arts/ Technology Teacher Education (comparing program characteristics, student demographics, student success, and teaching success of graduates from five or six Holmes institutions that endorse the tenets expressed in "Tomorrows Teachers" in varying degrees).

(2) Identify the components of effective teaching in Technology Education.

(3) Identify the student demographic characteristics and school experiences that are most appropriate to prepare effective technology teachers.

(4) Study effects of university/school partnerships in the transition of both school and university from traditional industrial arts to technology education.

(5) Determine the most effective math/science/technology interface for the preparation of effective technology teachers.

(6) Identify the most effective types of clinical experiences (both school-based and industry-based) for Technology Teacher Education.

It is imperative that research be conducted on the development, implementation and evaluation of Technology Education Teacher Education programs. This is specially true as the field makes the major transition to

Technology Education. Thus, the major purpose for redesigning this program is to establish an active agenda researching Technology Teacher Education programs to contribute to the body of knowledge in the discipline of technology.

References

Boyer, E. L. (1983). High School. New York: Harper & Row.

Holmes Group. (1986). Tomorrow's teachers: A report of the Holmes group. East Lansing, MI: College of Education, Michigan State University.

Johnson, S. D. (1988). A philosophical base for developing technology education programs. Illinois Industrial Educator. 9(3), 2-5.

APPENDIX A

Technology Teacher Education Proposed Course Requirements

General Education Requirements	Semester Hours
Communication Skills:	
Speech Communication: 101 - Principles of Effective Speaking	3
Select One:	4
Rhetoric & Composition: 105 - Principles of Composition	
Rhetoric & Composition: 108 - Forms of Composition	
Business & Technical Writing: 272 - Report Writing	3
Sub-total	10
Mathematics and Science:	
Mathematics - Calculus	5
Biology: 110 - Biological Sciences	5
Select One:	4-5
Physics: 101 - General Physics	
Chemistry: 101 - General Chemistry	
Sub-total	14-15
Humanities/Fine Arts:	
Select One:	4
History: 151 - History of the U.S. to 1877	
History: 152 - History of the U.S., 1877 to present	
Select One:	3
School of Art & Design: 185 - Design I	
School of Architecture: 171 - Architectural Design, I	
Select One:	3
Philosophy: 275 - Technology and Human Values	
Philosophy: 101 - Introduction to Philosophy	
Elective - Selected to meet "non-western/third world culture" req.	3-4
Sub-total	13-14
Social Science:	
Political Science: 150 - American Government	3
Psychology: 100 - Intro to Psychology	4
Economics: 101 - Intro to Economics	4
Select One:	3-4
Sociology: 218 - Technology & Society	
Anthropology: 250 - Intro to Primitive Technology	
Sociology: 100 - Intro to Sociology	
Anthropology: 102 - Origin of Man and Culture	
Sub-total	13-14
Health/Physical Development:	
Select One:	2-3
Health and Safety Studies: 121 - First Aid	
Health and Safety Studies: 208 - Intro to Safety & Occ. Health	
Sub-total	2-3
General Education Requirement Totals	52-56

Technology Sequence (Major)		Semester Hours
Technology Literacy Component:		
* VoTec: 361 - Introduction to Technology		4
* VoTec: 362 - Technological Systems		4
* VoTec: 364 - Technological Assessment		2
* VoTec: 366 - Technological Developments		2
	Sub-total	12
Technology Specialization Component:		
Approved Advanced Coursework		24
	Sub-total	24
Technology Synthesis Component:		
* VoTec: 368 - Technology Synthesis		4
	Sub-total	4
Technology Sequence Requirement Totals		40
(* - porposed new courses)		

Contributory Minor	Semester Hours
Approved minors include Computer Science, Mathematics, Science, Social Studies, and Instructional Application of Computers in Education.	
Contributory Minor Requirement Totals	20-30

Professional Education Sequence	Semester Hours
EPS: 201 or 301/304 - Foundations of American Education	3
Ed Psy: 211 or 311 - Psychology of Teaching and Learning	3
VoTec: 309 - Teaching Exceptional and Adult Students	4
VoTec: 381 - Foundations of Vocational Education	4
VoTec: 383 - Planning and Organizing Content	4
VoTec: 388 - Methods of Teaching	4
VoTec: 382 - Education/Business Collaboration	4
Votec: ??? - Assessment and Evaluation	2
Votec: ??? - Instructional Technology	2
Professional Education Sequence Requirement Totals	32

Clinical Experience Sequence	Semester Hours
VoTec 189/385 - Supervised Industrial Experience	4-6
Select One:	
Public Sector Teaching	
SecEd 241 - Methods/Seminar	4
Ed.Pr.: 242 - Educational Practice in Secondary Education	8
Private Sector Training	
VoTec: 152 - Pre-educational Internship	2
VoTec: 252 - Educational Internship	8
Clinical Experience Requirement Totals	16-18
Total Technology Teacher Preparation Program Requirements	160-170

APPENDIX B

Sample Course Sequences for Technology Specialization

Communication Technology

GE 103	Engineering Graphics (Computer-Aided-Drafting)	3 hrs
AGCOM 110	Introduction to Agricultural Communications	1 hr
AGCOM 114 (JOUR 114)	Ag Communication Media and Methods	3 hrs
AGCOM 214 (JOUR 214)	Ag Communication Strategy	3 hrs
AGCOM 240	Photography in Ag	3 hrs
ARTCI 180	Introduction to Cinematography	3 hrs
ARTID 134	Introduction to Industrial Design	3 hrs
COMSCI 106	Introduction to Computers	3 hrs
COM 264	Economic Structure of Communications	3 hrs

Industrial Technology

ARTGP 187	Fundamentals of Drawing	2 hrs
ARCH 171	Architectural Design I	3 hrs
AGM 200	Agricultural Mechanics Shop: Construction Technology	3 hrs
AAE 281	Introduction to Renewable Energy Sources	3 hrs
PHYSC 140	Practical Physics: How Things Work - A Course for Nonscientists	3 hrs
CS 106	Introduction to Computers for the Nontechnical Major	3 hrs
ARTID 271	Materials and Processes I	3 hrs
ARTPH 115	Basic Photography	3 hrs
STS 202	Management of Control of Technology	3 hrs

Design Technology

ARTGP 117	Drawing I	3 hrs
ARTGP 118	Drawing II	3 hrs
ARTGP 119	Design I	3 hrs
ARTGP 120	Design II	3 hrs
ARTGP 121	Drawing Theory	2 hrs
ARTGP 122	Drawing Theory	2 hrs
ARTID 133	Design Workshop	3 hrs
ARTID 134	Introduction to Industrial Design	3 hrs
ARTID 271	Materials and Processes I	3 hrs

Architecture Technology

ARCH 231	Anatomy of Buildings	4 hrs
ARCH 232	Construction of Buildings	4 hrs
ARCH 241	Environmental Technology	4 hrs
ARCH 335	Computer Applications in Architecture I	4 hrs
COMPSCI 102	Introduction to Computers for Architects	3 hrs
CIVILENG 201	Engineering Surveying	4 hrs
CIVILENG 216	Construction Engineering	3 hrs

Manufacturing Technology

COMPSCI 101	Introduction to Computers for Engineers	3 hrs
MECH&INDENG 335	Industrial Quality Control	3 hrs
MECH&INDENG 350	Computer-Aided Manufacturing	3 hrs
MECH&INDENG 355	Numerical Control of Manufacturing Processes	3 hrs
MECH&INDENG 363	Facilities Planning and Design	3 hrs
MECH&INDENG 360	Analysis of Materials Machining	3 hrs
ARTID 271	Materials and Processes	3 hrs
GE 103	Engineering Graphics	3 hrs

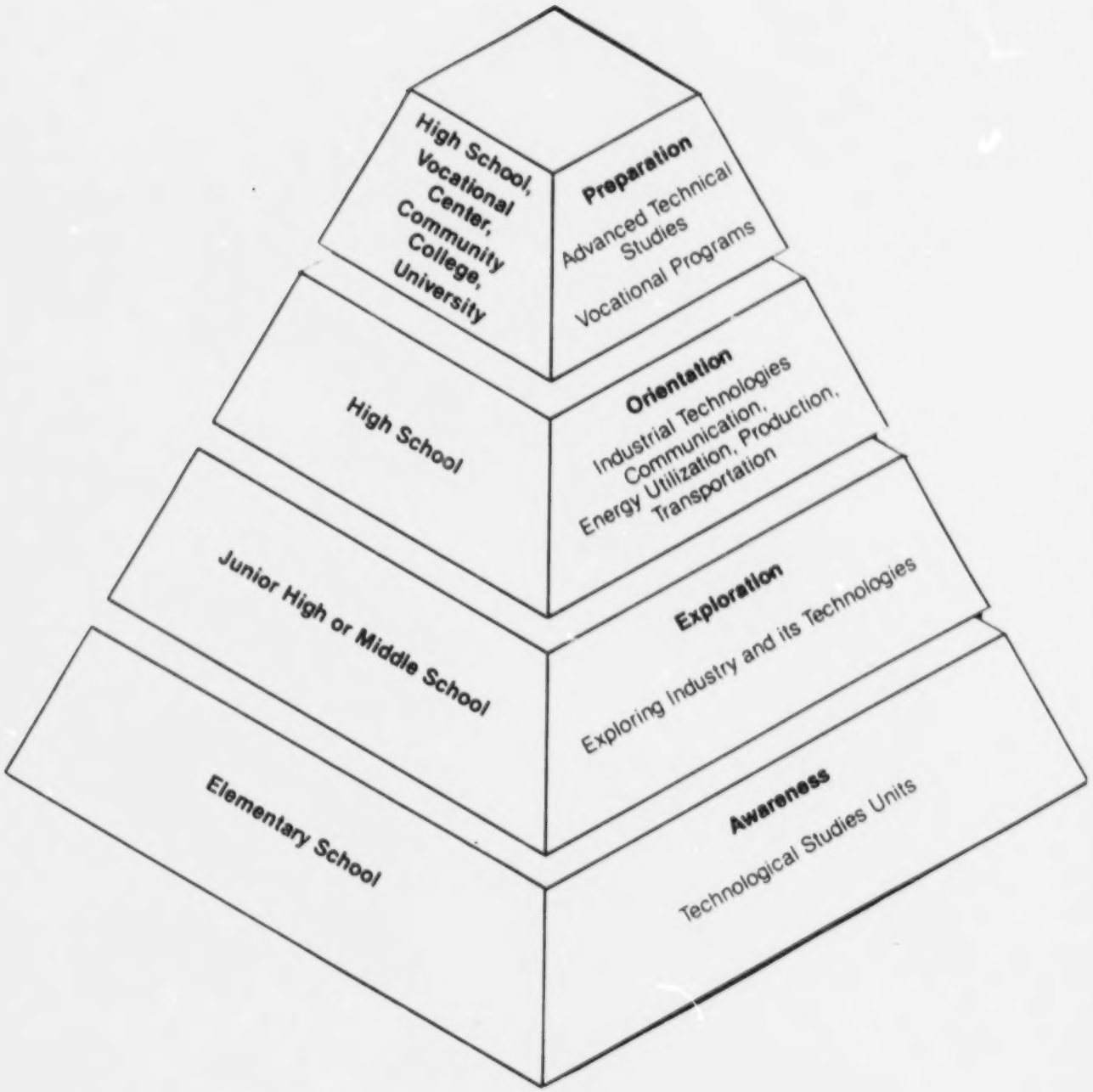
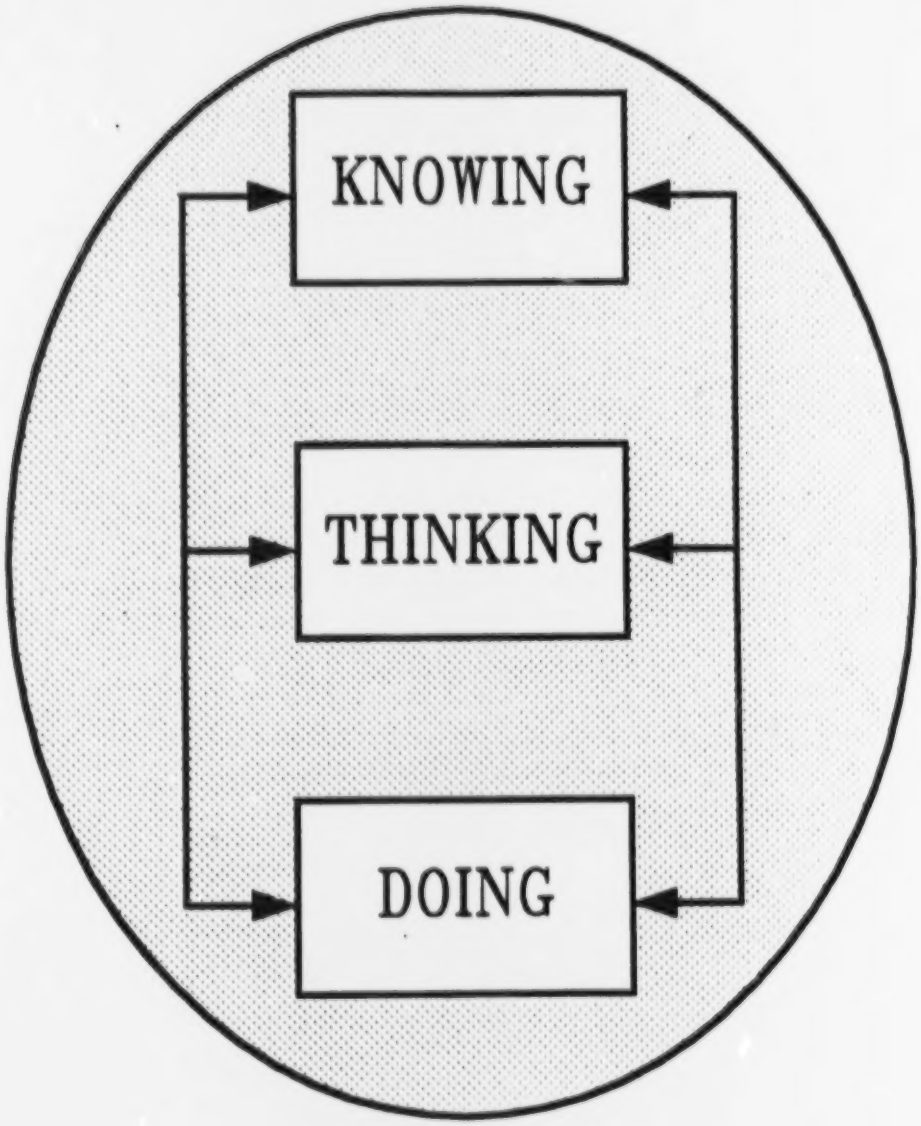

High School, Vocational Center, Community College, University
Preparation
Advanced Technical Studies
Vocational Programs
High School
Orientation
Industrial Technologies
Communication,
Energy Utilization, Production,
Transportation
Junior High or Middle School
Exploration
Exploring Industry and its Technologies
Elementary School
Awareness
Technological Studies Units

Figure I

Figure 2



The Noumenon of Technology.

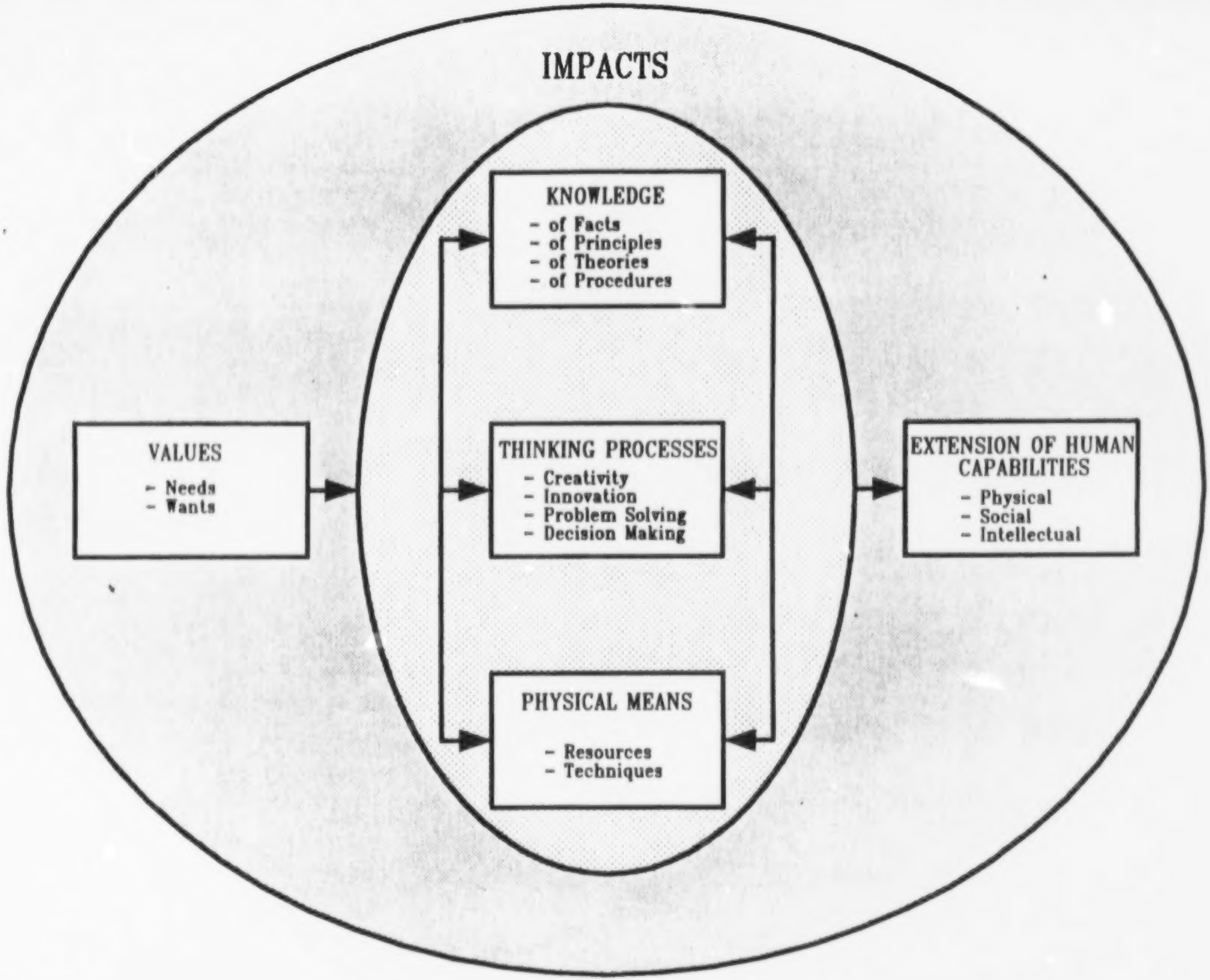
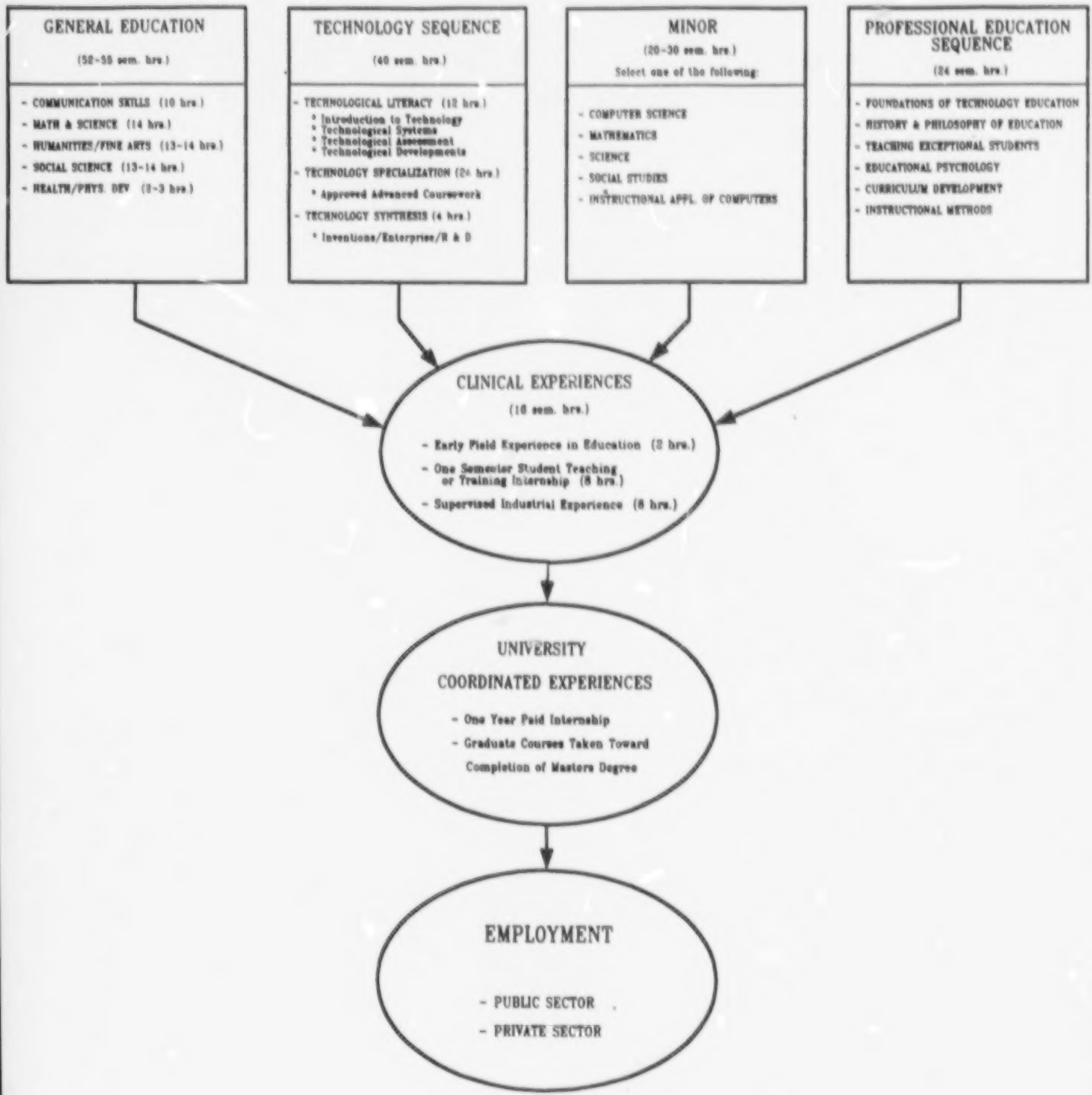
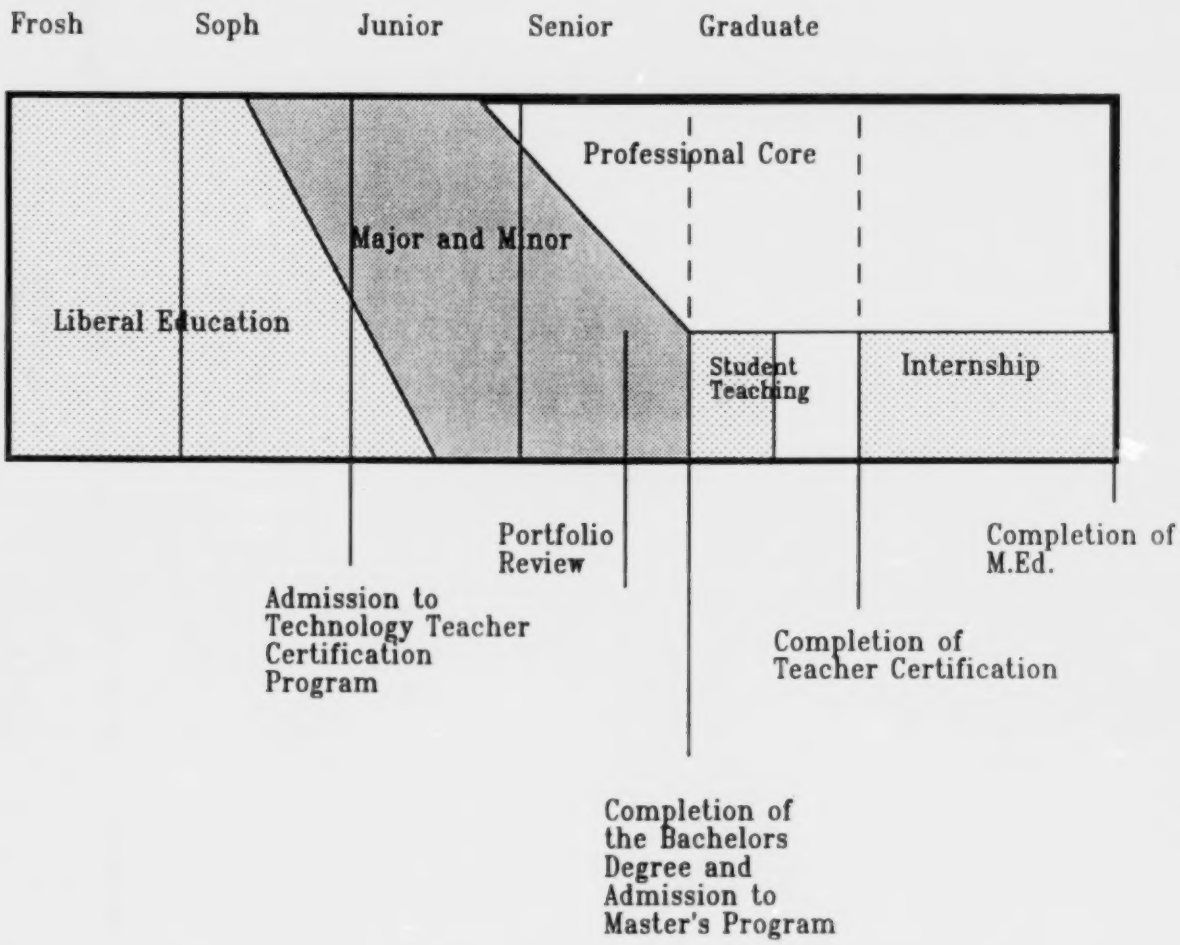


Figure 3. Interactive Model of Technological Activity.

TECHNOLOGY TEACHER EDUCATION
(TTE)



Technology Teacher Education Sequence



Teacher Preparation in Industrial Education: Program Proposal from the Faculty in Industrial Education

David C. Bjorkquist
University of Minnesota

I. TEACHER PREPARATION IN INDUSTRIAL EDUCATION

The Division of Industrial Education is dedicated to the preparation of educators who teach the concepts of the technology, occupations, and organizations of industry. This teaching occurs in a variety of settings where the purposes are to increase learners' awareness of themselves and technology, to provide for their exploration of ideas, processes, and materials, or their specialized learning about industry. Programs in industrial education have long been situated within the public schools at the elementary, junior and senior high school, and post-secondary levels, and have also been present in settings of industry itself. The balance of these various thrusts has shifted from time to time, but the programs at all levels, in all settings, and for all purposes complement one another. Helping to maintain the complementary nature of these programs is an important function of the teacher preparation program in the Division of Industrial Education.

This proposed program provides a framework for the preparation of all industrial education teachers. It is designed to help meet the long-term need for industrial educators in Minnesota. The need for these teachers is measured both in numbers of teachers and in the characteristics of those who teach. This program is not intended to satisfy a large proportion of the demand for teachers in Minnesota, but it should help to meet the need for teachers who will make a difference in the educational experience of Minnesotans. Because there is no existing industrial teacher education program like the one proposed here, it should be of interest to teacher educators in the field across the nature.

In developing the proposed program, the Industrial Education faculty gave particular attention to four factors: research, integration, centrality, and quality. These factors help to clarify the intentions and the priorities of the faculty. They have served as a guide in developing individual proposals for courses and in program operations.

Research is not only an obligation of the faculty, it is also an appropriate subject for students in their earliest stages of teacher preparation. The technology of industry, as well as the technology of instruction, is founded in research and there is amble justification for engaging students with faculty members in learning and conducting research as part of teacher preparation. These research competencies should be applied by teachers in their own laboratories and classrooms.

The concept of integration is important in the operation of the industrial teacher education program because of the needed efficiency gains and learning opportunities that it provides. Integration applied to the teaching, service, and research of individual faculty members and to the work of the Division as a whole. It also applies, in a vertical sense, to

faculty, graduate student, and undergraduate student scholarship. Furthermore, it applies to the need to meld different student groups within industrial education. For this reason, one undergraduate degree is proposed as part of this teacher education program. In this way, industrial education students with somewhat different career objectives will experience a common set of industrial education course offerings.

This proposed program gives attention to the centrality of Industrial Education within the University of Minnesota. It deliberately places Industrial Education students in courses that support understanding of industrial concepts rather than teaching all of those things within the Division, and it makes course offerings in Industrial Education attractive to other University students.

Industrial Education is committed to improving the quality of all of its efforts. This applies to the selection of students, instruction, research, and other acts of scholarship. Improvement of quality in one area will lead to higher quality in others. This commitment to improving quality demands a better understanding of what quality means, particularly as applied to industrial education. As a field that is uniquely situated at the junction of industry and education, there are some special ways in which quality may be interpreted. The improvement of quality will result in making industrial education more attractive as a field of study and will complement the other principles described above.

The need for an experimental program for the preparation of industrial educators is evident. The subject matter of the field probably has changed more during the last decade than any other subject included in the curriculum of the schools. Furthermore, these changes are most likely to continue. There is no industrial technology, occupation, or organization that is unaffected by change. However, the changes have not as yet been fully reflected in the industrial education offerings of the schools. We recognize the need to experiment with and learn how to prepare teachers so they will accept more responsibility for keeping current with their field of study.

Lately, industrial teacher preparation programs in Minnesota have had limited influence on the schools because of the low turnover rate of teachers. A large number of the present teacher corps were employed during the expansion years of the late 1950's and early 1960's and are still in the schools. This, coupled with the declining size of secondary schools, has provided few opportunities for new teachers to enter the field. This circumstance should change as enrollments in the secondary schools increase and as older teachers retire.

We seriously doubt that the teacher education institutions in Minnesota will prepare the number of industrial education teachers that will be needed from now until the end of this century. In 1984-85, 45% of the approximately 1000 industrial technology teachers in Minnesota were 45 years of age or older. The percentage in this age bracket has been increasing (there were 31% in 1977-78). The increased demand for teachers will come at a time when the capacity to graduate industrial technology teachers has eroded. Winona State University no longer has a program. The program at Mankato State University has been reorganized and one faculty member

coordinates the teacher education major. At Moorehead State University the program emphasis has shifted from teacher preparation to industrial technology and engineering technology accreditation is being sought. The changes in the qualifications of the faculty to engineering and technology from education make it unlikely that those programs will produce many teachers in the future. With other industrial education teacher preparation programs in Minnesota producing fewer graduates, the percentage of teachers supplied by the University of Minnesota is likely to increase.

The proposed teacher preparation program will, therefore, have a significant impact on industrial technology teaching in the State. The program will be unlike any other now in existence. With its experimental nature, it should be better able to address more of the problems of teaching in the field.

II. UNDERGRADUATE PROGRAM: B.S. IN INDUSTRIAL EDUCATION

A. Goals

The Division will operate one (non-licensure) undergraduate program. its goals will be as follows:

1. Provide a program founded on study of the field of industrial education as a whole (rather than on separate delivery systems), that is supported by an active research program.

2. Provide preparation (within the one-degree program) for (a) person who will become employed as trainers in industry, or (b) vocational-industrial educators who wish to improve their professional qualifications, or (c) persons who will later seek initial licensure (through post-baccalaureate level training) as industrial technology educators.

3. Prepare persons who have an understanding of the inquiry process and who see their professional roles in terms of putting this understanding into practice.

4. Prepare educators who have a multi-cultural and global perspective of the world and how industrial education fits into that perspective.

5. Provide an instructional environment that is intellectually stimulating for undergraduate and graduate students, as well as faculty.

6. Utilize the strengths of the University and build connections with colleagues in other fields in order to make industrial education more central to the mission of the University.

7. Increase the demand for undergraduate-level preparation in industrial education and reduce the number of offerings in order to sustain the program at an efficient level.

B. Rationale

1. Speciality Studies (Subject Matter) in Industrial Education

(a) The faculty of the Division of Industrial Education has recently produced an innovative conceptualization of the content of industry (Swanson, R. A. (Ed.) 1983). A view of industry. St. Paul, MN: Division of Industrial Education).

The content for speciality studies will be selected from, and organized in accordance with, this conceptualization of industry. (A preliminary examination reveals that the conceptualization of industry can also be used to satisfy the present subject matter licensure requirement for industrial technology teachers and provide the breadth desired for persons who will practice as trainers in industry.)

(b) Competence in the subject matter will be developed using courses drawn from those offered by the Division, by other departments in the University, by technical institutes, and by private organizations, as well as through industrial work experience.

(c) Those industrial educators who practice in vocational-industrial education programs require a greater level of technical competence in a specialized area of industry than can be provided through available time or resources. Features of the existing B.S. in Vocational-Industrial Education degree, which permit awarding credit for existing occupational competence, will, therefore, be incorporated into the B.S. in Industrial Education degree.

2. Professional Studies in Industrial Education

(a) The role and responsibilities of the several programs in which industrial educators practice are becoming more alike. Vocational-industrial and industrial training programs formerly delivered only specialized education; now educators in these programs are also responsible for delivering a significant component of general/liberal education (e.g., employability skills, basic academic skills, occupational exploration). Similarly, industrial arts education, now being transformed into industrial technology education, is beginning to emphasize the study of selected technological systems as well as the impact of these systems on society.

(b) The broad purposes of the field of industrial education may not be thought of as helping learners (i) understand industrial systems for producing goods and services and their impact on individuals, society, and the environment; (ii) develop realistic vocational self-concepts about industrial occupations; and (iii) acquire selected occupational competencies (both common and specialized relevant to industrial occupations and processes.

(c) The professional studies for industrial educators must prepare them for broadened responsibilities that are similar for all practitioners in the field.

3. Liberal Studies for Industrial Educators

(a) Teaching for and about industrial education requires not only speciality (subject matter) and professional (education) competence, but also the ability to relate the content and goals of industrial education to the broader concerns of society-including the natural and man-made environments.

(b) The existing liberal education requirements established by the University's Committee on Liberal Education provide a sufficiently flexible framework from which to select appropriate educational experiences for industrial educators.

4. Program Dynamics

(a) Because of rapid changes in the technology and the nature of education in American society, industrial educators must acquire the dispositions and skills necessary to solve technical and professional problems and to help learners develop the same abilities. The use of inquiry in instruction will also enable the faculty to integrate its research agenda with instructional responsibilities (e.g., doctoral students and faculty using laboratories and classrooms for research designed to improve industrial education theory and practice). Consequently, inquiry will be a principal method by which technical and professional studies will be taught, especially at the advanced levels.

(b) Content will be planned and courses sequenced so that both efficiency and effectiveness of learning can be maximized. For example, speciality and professional studies can be coordinated and articulated to provide opportunities for illustrating theory and developing application skills. The "fit" between industrial education courses and other University courses can be improved by learning about those other courses and carefully selecting or influencing the content in some of them for the benefit of industrial education students.

(c) Special attention will be given to the language and examples used in instruction to implement the integration of students who are planning to practice in different kinds of industrial education programs.

5. Program Setting

The preservice program will be delivered on-campus or in other locations, particularly those where industrial education is practiced. This also will mean involving practitioners from those sites into the process of preservice preparation.

C. Structure

1. General

(a) Figure 1 depicts the overall structure of the proposed B.S. in Industrial Education as a part of an initial licensure program for Industrial Technology Teaching.

(b) Graduates from the B.S. program who wish to practice as vocational-industrial teachers or industrial trainers, rather than as industrial technology teachers, will enter full-time employment after the B.S., or they will continue in a master's-level program.

2. Liberal Studies

(a) All industrial education students will fulfill existing CLE requirements, including group distribution, English Composition, world studies, and cultural pluralism requirements.

(b) Where course choices are permitted within CLE requirements, industrial education students will be advised or required to select those that enhance the study and practice of industrial education.

3. Specialty Studies

(a) The following are the major organizers for delivering specialty content in a laboratory setting[1]. (The organizers are drawn from the conceptualization recently developed by the faculty of the Division.)

(i) Construction - Study of the on-site production of residential and non-residential structures.

(ii) Manufacturing - Study of the in-plant production of durable goods by custom and mass production methods.

(iii) Power-Study of the conversion and control of power for communication, electricity, electronics, transportation, and production systems.

(iv) Communication - Study of the production of visual images to transfer ideas for the purposes of goods, production, marketing, and media.

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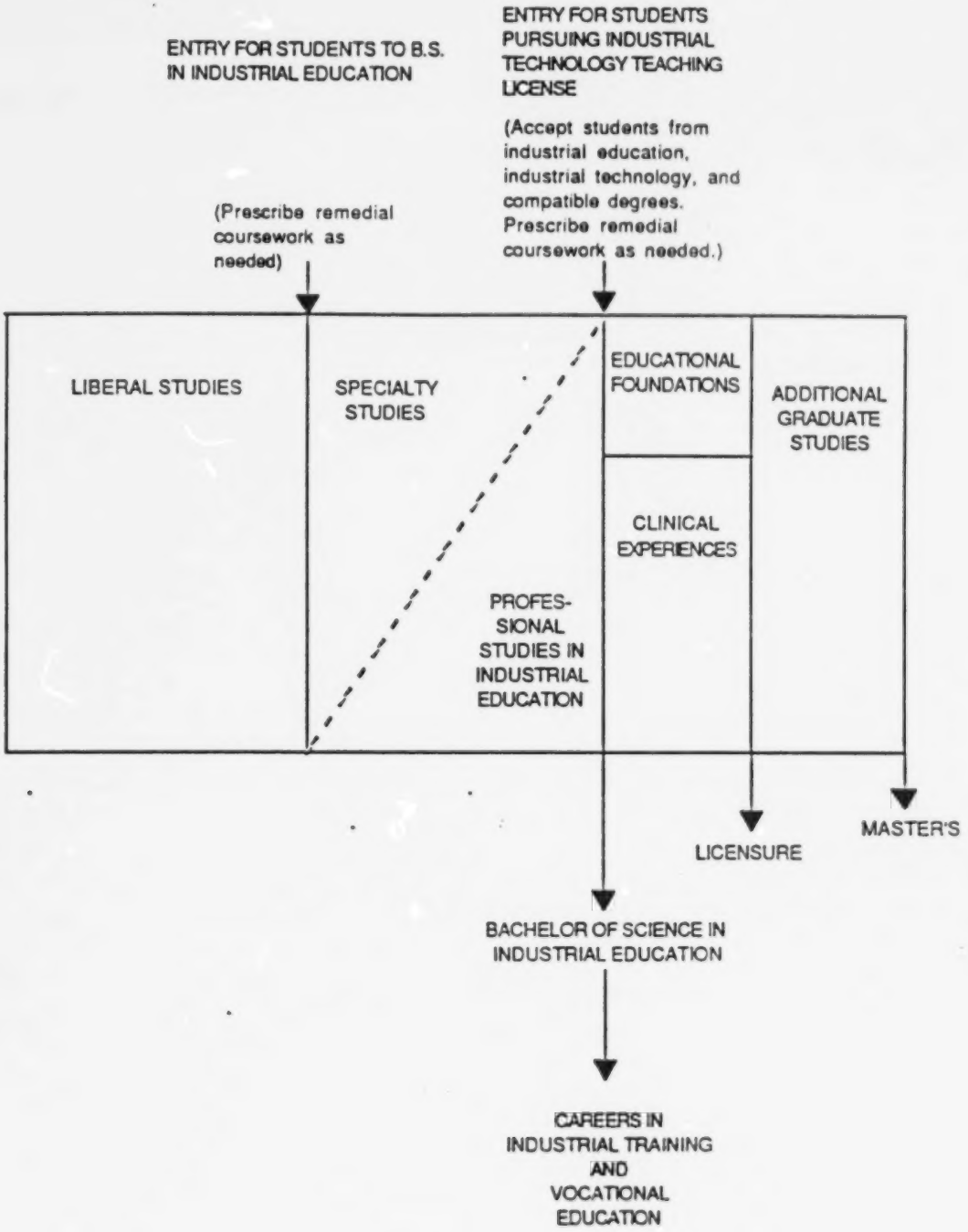
[1]These organizers will be integrated in advanced-level courses.

FIGURE 1

INDUSTRIAL EDUCATION PROGRAM MODEL


ENTRY FOR STUDENTS TO B.S. IN INDUSTRIAL EDUCATION
ENTRY FOR STUDENTS PURSUING INDUSTRIAL TECHNOLOGY TEACHING LICENSE
(Accept students from industrial education, industrial technology, and compatible degrees. Prescribe remedial coursework as needed.)
(Prescribe remedial coursework as needed)
LIBERAL STUDIES
SPECIALTY STUDIES
EDUCATIONAL FOUNDATIONS
ADDITIONAL GRADUATE STUDIES
CLINICAL EXPERIENCES
PROFES-SIONAL STUDIES IN INDUSTRIAL EDUCATION
LICENSURE
MASTER'S
BACHELOR OF SCIENCE IN INDUSTRIAL EDUCATION
CAREERS IN INDUSTRIAL TRAINING AND VOCATIONAL EDUCATION

(b) Beyond the development of basic knowledge and skills, specialty content will be taught using problem-solving, troubleshooting, and research. These processes include:

(i) System analysis

(ii) quality and productivity planning

(iii) problem identification/needs assessment

(iv) research, design, and development

(c) The following are major organizers for delivering specialty support content. They are essential to the study of industrial practices and to understanding industry's roles in society.

(i) Industrial Practices and Processes - Study of the organization and operation of industries. (This may be taught by on-site visits, guest speakers and films.

(ii) Group processes - Study of the ways groups of people perform in the industrial work environment. (Could be presented through case studies.)

(iii) Application of Technology - Study of the evolution of technology and its impact on society.

(d) All the above technical studies will be taught as a part of the undergraduate experience. Instruction will utilize the resources of the Division, local technical institutes, local firms, and other parts of the University. (It is anticipated that the Division will use fewer resources for the proposed set of technical studies than it now uses for that purpose.)

4. Professional Studies in Industrial Education

(a) The following are the major organizers for delivery professional studies in industrial education.

(i) Vocational development

(ii) Foundations

(iii) Curriculum

(iv) Instruction

(v) Evaluation

(vi) Management

(b) The content within the above organizers will be taught so as to develop critical, reflective, and reflexive practitioners of industrial education, who are able to make decisions about effective practices and who are able to identify the factors which influence effectiveness. Further, the methodology used will also provide sufficient opportunities for students to develop skill in applying the content in realistic situations.

(c) Professional studies courses in the B.S. program will also be used off-campus to satisfy the requirements of the "Teacher Education Sequence" (TES).

(d) The total number of professional studies courses now offered by the Division will be decreased in the process of redesigning the B.S. in Industrial Education degree. Toward this end, and in the interest of improving the efficiency of instruction in the Department and the College, opportunities to offer courses jointly with other Divisions in the Department and to use courses in other departments will be carefully explored.

5. Professional Studies in Education

(a) Professional studies in education at the undergraduate level will give students an orientation to education prior to entering the post baccalaureate professional program.

(b) Professional studies in education provide options in course selections so the needs of all industrial educators can be addressed, whether they are in the public or private setting or at the secondary school or adult level.

D. <u>The Program</u> 180 credits

Speciality Studies 75 credits

Issues, Structures, and Functions of Industry 21 credits
to be chosen from:
Ind 1660, Industrial Service (3 cr)
Arch 1021, History of Architecture (4 cr)
Arch 1022, History of Landscape Architecture (4 cr)
Arch 3001, Environmental Design: Man and Environment (4 cr)
Arch 3002, Environmental Design: Tools and Processes (4 cr)
CSi 3001, Perspectives on Computers and Society (4 cr)
Econ 3501, Labor Economics (4 cr)
Econ 3601, Industrial Organization and Antitrust Policy (4 cr)
Geog 3331, Economic Geography (4 cr)
Geog 3341, Industrialization and World Trade (4 cr)
Geor 3345, Energy and Minerals (4 cr)
Geog 5383, Transportation Geography (4 cr)
Hist 3841, American Business History (4 cr)
Hist 3851, American Labor History in the 19th Century (4 cr)
Hist 3852, American Labor History in the 20th Century (4 cr)

HSci 1711, 1722, 1713, Technology and Western Civilization (4 cr each)
HSci 5311, Technology in American Life (4 cr)
IntR 5831, Analysis of World Futures Models (4 cr)
Phil 3306, Ethics and Engineering (5 cr)

Technical Content[2] 18 credits
Ind 1600, Drafting (3 cr)
Ind 1612, Construction (3 cr)
Ind 1620, Visual Communication Technology (3 cr)
Ind 1632, Manufacturing (3 cr)
Ind 1655, Complex Power Systems (3 cr)
Ind 3750, Industrial Practices and Processes (3 cr)

Research and Development Skills and Content Application[2] 18 credits
to be chosen from:
Ind 1602, Technical Design (3 cr)
Ind 1608, Architectural Drafting (3 cr)
Ind 1610, Materials Processing: Nonmetallice (3 cr)
Ind 1622, Graphic Communication (3 cr)
Ind 1624, Photography (3 cr)
Ind 1630, Materials Processing: Metallic (3 cr)
Ind 1640, Electronics (3 cr)
Ind 1642, Electronic Systems (3 cr)

Advanced Technical Content[1, 2] 18 credits
to be chosen from:
Ind 3110, Construction: Intermediate (3-9 cr)
Ind 3111, Construction: Advanced (3-9 cr)
Ind 5112, Construction: Specialization (1-9 cr)
Ind 3120, Graphic Communication: Intermediate (3-9 cr)
Ind 3121, Graphic Communication: Advanced (3-9 cr)
Ind 5122, Graphic Communication: Specialization (1-9 cr)
Ind 3130, Manufacturing: Intermediate (3-9 cr)
Ind 3131, Manufacturing: Advanced (3-9 cr)
Ind 5132, Manufacturing: Specialization (1-9 cr)
Ind 3140, Power and Energy: Intermediate (3-9 cr)
Ind 3141, Power and Energy: Advanced (3-9 cr)
Ind 5142, Power and Energy: Specialization (1-9 cr)
Ind 3150, Transportation: Intermediate (3-9 cr)
Ind 3151, Transportation: Advanced (3-9 cr)
Ind 5152, Transportation: Specialization (1-9 cr)

[1]A minimum of 9 credits must be completed in one of the areas above.
[2]Students with sufficient occupational experience in the area in which they intend to teach to be eligible for licensure as a vocational-industrial education teacher in a Minnesota Technical Institute will be granted 54 credits on the basis of demonstrated occupational competency and are exempt from the required courses in this category. The 54 credits will be awarded after completion for all other degree requirements.

Professional Studies in Industrial Education 30 credits

Vocational Development 3 credits
Ind 5320, Vocational Guidance (3 cr)

Curriculum 4 credits
Ind 5330, Industrial Course Construction (4 cr)

Instruction 13 credits
Ind 1300, Introduction to Industrial Education Teaching (3 cr), or
Ind 1301, Introduction to Vocational-Industrial Teaching (3 cr)
Ind 5360, Industrial Instruction (4 cr)
Ind 5303, Instructional Aids (3 cr)
VoEd 5800, Working with Special Needs Students (3 cr)

Evaluation 4 credits
Ind 5301, Tests in Industrial Subjects (4 cr)

Management 3 credits
Ind 5344, Facilities and Management (3 cr)

Foundations 3 credits
Ind 5325, Foundations of Industrial Education (3 cr), or
VoEd 5300, Philosophy and Practice of Vocational Education (3 cr)

Professional Studies in Education 10 credits

Ed Psy 3131, Introduction to Human Relations (3)
PubH 3004, Basic Concepts in Personal and Community Health (5)
Hlth 1500, American Red Cross Standard First Aid and Personal Safety (2)

Liberal Studies 62-65 credits

Group A - Language, Logic, Mathematics, Argument 13 credits
Math 1111, College Algebra and Analytical Geometry (5 cr)
AgET 3030, Intro to Problem Solving with Computers (4 cr), or
GC 1571, Intro to Basic and to Micro-computers (4cr)
Spch 1101, Fundamentals of Speech Communications (4 cr), or
Rhet 1222, Public Speaking (4 cr)

Group B - The Physical and Biological Universe 12 credits

Group C - Individual and Society 16 credits
Psy 1001, Introduction to Psychology (5 cr)

Group D - Literacy and Artistic Education 12 credits

Writing Practice 9-12 credits

Comp 1011, Writing Practice (5 cr), and
Comp 3032, Preprofessional Writing for Business (4 cr)
OR Rhet 1101, Writing to Inform and Persuade (4 cr), and
Rhet 1151, Writing in Your Major (4 cr), and
RHET 3562, Writing in Your Profession (4 cr),
OR GC 1421, Writing Lab: Personal Writing (4 cr), and
GC 1422, Writing Lab: Communicating in Society (4 cr), and
GC 3425, Writing for Business & the Profession (4 cr)

Electives (Sufficient credits must be taken to complete the 180 credit degree requirement.)

E. Entry to the Program

1. Admission Requirements

(a) Entry to the B.S. program will be after the student has completed a minimum of 45 quarter credits of work in an accredited college or university.

(b) A minimum G.P.A. of 2.50 will be required in all previous college-level work to be considered for admission. In addition, students who wish to be considered for admission must complete a questionnaire concerning education, work, and other relevant experiences.

2. Counseling

(a) In order to coursel students about preparing for careers in industrial education, and undergraduate advisor will be employed to work with in the appropriate college(s) of the University which accept freshman.

(b) Undergraduate advising will be provided within the Division by one or more staff members.

III. INITIAL LICENSURE PROGRAM FOR INDUSTRIAL TECHNOLOGY TEACHERS

A. Entry to the Program

1. Admission Requirements

(a) Entry to the initial licensure program will be after the student has completed a baccalaureate degree from any accredited college or university, with the provision that the student make up any deficiencies in undergraduate work (using the B.S. in Industrial Education described above as the standard) that is prescribed by the Division advisors.

(b) A minimum G.P.A. of 2.8 will be required in all previous College-level work to be considered for admission. In addition, students who wish to be considered for admission must complete a standardized test, and a questionnaire concerning education, work, and other relevant experiences. The Pre-professional Skills Test must be completed after admission, but before enrolling in courses.

B. Structure

1. Educational Foundations

(a) The description of educational foundations should concentrate on the outcomes or results expected by foundational study. They description of all foundations components should consider that College of Education students will have baccalaureate degrees with substantial components of foundations study prior to entering the College. Foundations preparation in the College should build on this previous education. Once consensus is reached on the outcomes or results expected, the courses or experiences that may generally produce the devised outcomes can be defined.

(b) Students will select courses or experiences from the following categories to satisfy the foundations' requirement:

(i) knowledge of the learner, learning, and teaching.

(ii) knowledge of the history, politics, philosophy, and purposes of education, including such areas as the structure, interpretation, and criticism of education as it currently exists and the ethical and aesthetic dimensions of education

(iii) knowledge of the social and personal content of education including the sociological and anthropological perspective in which education is planned, implemented, and evaluated

(c) The three categories above appear to be traditional but they are offered with these underlying concerns:

(i) The timing for teaching foundations is critical. Foundations taught prior to field experience in the schools may have limited usefulness. This concern is raised by the comparative value given by teachers to foundations courses taken before teaching

(ii) It should not be assumed that there is a block of credits, such as 18 credits, in the teacher education program for foundations courses. An assessment of students entering foundations study and their need for foundations study should be made.

2. Clinical Experiences

(a) The clinical experiences will be conducted over an academic year will be located, primarily, on site at a school.

(i) Fall Quarter: Observation and teaching for 2 hours per day. (4 cr) (Seminar 3 cr)

(ii) Winter Quarter: Research and development in the schools. (6 cr School Based Project)

(iii) Spring Quarter: Full time teaching. (9 cr)

3. Additional Graduate Studies

(a) With the completion of additional 5000 level courses, a student may meet the requirements for the Master of Education degree. The number of credits needed to complete the degree will vary according to the number of credits completed in the Foundations and Clinical Experiences components of the program. A minimum of 45 credits will be required to complete the Master's of Education degree.

IV. RESEARCH AGENDA

A. Conceptual Framework

The research agenda for Industrial Education is set within the conceptual framework for Industrial Education as shown in the following figure.

FIGURE 2

A CONCEPTUAL FRAMEWORK FOR INDUSTRIAL EDUCATION

Educational Purposes	Domains of Industry: Structures and Functions	Technologies	Occupations
Awareness			
Exploration			
Specialization			

In general, research in Industrial Education will deal with the accomplishment of the educational purposes across the domains of industry. The purposes include developing awareness, exploration, and specialization learnings about the structures and functions, technologies, and occupations of industry. This research may relate to problems of secondary schools, the post-secondary technical institutes, or industrial training and development. The research of the faculty, graduate students, and undergraduate students will fall within this framework.

B. Undergraduate Student Research

The primary research and development purpose of undergraduate students will be to address the questions, problems and concerns of practitioners, including teachers, trainers, and other school and industrial professionals. This research and development will be conducted by individuals and by teams of undergraduate students and teams that include graduate students and/or faculty members.

FIGURE 3
TOPIC AND TYPE OF INDUSTRIAL EDUCATION RESEARCH

	Research Type	
Research Topic	Laboratory	On-site
Instructional Content		
Instructional Method		

Each undergraduate student will develop a portfolio that will contain artifacts of the research and development in which the student engages. This will include written reports of research method and outcomes and many include products of the research process, such as instruments developed for data collection, diagrams, photographs, and video tapes. Guidance in the development of portfolios will be provided by the faculty.

Portfolio development will be introduced in the course, IND 1300, Introduction to Industrial Education Teaching. The purposes of the portfolio will be to match students with appropriate research projects upon entry into new classes, assess student progress in research development, document the variety of research experiences of each student as individual researchers and as a research team members, and add to the credentials of the graduate seeking employment. There will be an annual evaluation of the total portfolio of each student by the Industrial Education faculty.

C. Graduate Student Research

Graduate students will engage in research as part of their graduate work and as part of their assistantships. A research study is included in the Ph.D., Ed.D., and M.A. degrees as specified by the Graduate School and graduate program documents of the Department of Vocational and Technical Education and the Division of Industrial Education.

Those graduate students who are employed as Teaching Assistants will also conduct research as part of their responsibility in teaching courses for undergraduate students. In this capacity they will function as facilitators and directors of research but will also have the opportunity to relate their research work, including that required for their degrees, to that being conducted by their students.

D. Faculty Research.

One dimension of the research of the faculty is that based on the preparation of industrial education teachers and trainers. To some extent, this research can be conducted in the educational facilities employed by the program. This includes the University campus as well as the extended facilities of the schools and industrial establishments used in the program.

Other research interests of the faculty go beyond the teacher and trainer preparation process and will be reflected in research projects. The realm of this research is illustrated in Figure 2. Many of these research interests will be facilitated by the integration of faculty effort with that of graduate and undergraduate students. Other faculty research will be implemented through centers for research, including the Training and Development Research Center, the Minnesota Research and Development Center for Vocational Education, and the National Center for Research in Vocational Education. The Division of Industrial Education will serve the functions of helping to focus research efforts on problems of industrial education and implementing the conduct of that research.

V. APPENDIX (Proposals for new and revised courses)

The Impact of the Holmes Group Recommendations at Virginia Tech

William E. Dugger and James E. LaPorte
Virginia Polytechnic Institute and State University

The Teacher Education Program

Introduction

Virginia Tech joined the Holmes Group initiative during the initial round of invitations. The decision to join was supported by the Provost, who is the chief academic officer at the University. At the college level, the decision to join was made democratically through a vote of the faculty. The Dean of the College of Education attempted to remain neutral prior to the voting process. A number of faculty members recognized, however, that the Provost controlled resources to the college and the fact that he supported the Holmes Group effort may have influenced the outcome of the vote.

Shortly after Virginia Tech officials joined the Holmes Group, an Ad Hoc Committee was organized to begin study of how the recommendations would be implemented. From the outset, the majority of the faculty did not support the elimination of the undergraduate degree in teacher education as called for in the Holmes recommendations.

In the midst of considering the Holmes Group initiative, the Governor's Commission on Excellence in Education recommended an extensive restructuring of teacher education programs in Virginia. The Commission believed that the education of teachers could be dramatically improved by insuring that all teachers receive a broad education in the arts and sciences coupled with greater depth in the selected teaching discipline. The details of the evolution of the restructuring requirements are presented in a later section of this paper.

The restructuring mandate from the state caused the energy of the faculty to be directed away from the Holmes Group per se. In fact, the Holmes Group was superseded by the state-mandated restructuring requirement. The details of the evolution of the restructuring mandate are presented in the section of this paper titled "The Change Process." It should be noted at this point, however, the many parallels to the Holmes Group as evident in the following summary of principal requirements:

1. Increasing the general education requirements.

2. Permitting no more than 18 semester hours (excluding student teaching) in professional course work in education.

3. Requiring a degree in an arts or science discipline appropriate to the endorsement being sought.

4. Requiring that all degrees be awarded outside of a college of education.

Unlike the Holmes initiative, the Virginia restructuring mandate was an across-the-board condemnation of the current process of teacher education. Unlike the Holmes Group, there was no direct expression of credence of the clinical/graduate study link. In fact, the role of graduate education in the preparation of teachers is, to date, indeterminate. Implicitly, neither NCATE requirements nor current teacher certification standards were to be considered in the development of restructuring proposals. Furthermore, no apparent regard was given to certification of teachers with credentials from other states.

The Program Philosophy

The faculty in the Technology Education Program at Virginia Tech adamantly and unanimously believe that technology education is a general education program rather than a vocational program. Though it has a career exploration responsibility to the students served in the public schools, this responsibility is no greater (nor lesser) than that of any other academic subject in the schools. Extending from this premise is the ideal of technology as a discipline and that the content of technology education was not available elsewhere in the University.

The argument that technology is a discipline resulted in an exemption to the requirement that the degree be granted outside of the college of education. In effect, technology education was considered to be "in a discipline appropriate to the endorsement being sought." An exemption was granted as well for teacher preparation programs in agricultural education, trade and industrial education, and physical education because no other program was available within the University to properly prepare teachers in these teaching specialties. Thus, beginning in 1990, only four undergraduate degrees will be awarded under the auspices of the College of Education.

Program Components

General Education. Virginia Tech began a University-wide core curriculum during the 1986-87 academic year. The philosophy of the core is to force students to select a specific focus of study and then pursue that focus in some depth. In other words, random selection of courses is not permitted. The 51 semester hour general education requirements of the restructured technology education program considerably exceeds the University core requirements of 32 semester hours. The specific requirements are listed below:

Humanities (18 semester hours)

Freshman English	6
Issues in Society and Technology	3
Science and Technology in Modern Society	3
Humanities Core Electives	6

Laboratory Sciences and Mathematics (21 hours)

Calculus with Trigonometry	6
Computer Science	3
Physics with Lab	8
Lab Science or Math Elective	4

Social and/or Behavioral Sciences (12 hours)

History of the United States	6
Social Science Core Courses	6

The restructured program is more rigorous than its predecessor in that a physics sequence is required along with calculus-based math. In addition, the student can no longer seek out unchallenging courses to fulfill general education requirements.

Major Coursework. The coursework in the technology education major is organized under the major areas of communication, production, and energy-power-transportation. These three content organizers are evolving to become universally accepted within the field.[1] The courses required for a major in technology education are listed below:

Communication (16 semester hours)

Technical Design	4
Graphic Communication	6
Communication Technology	3
Electronics I	3

Production (19 semester hours)

Materials and Processes	6
Manufacturing	3
Construction	3
Metals Technology and Fabrication	4
Advanced Problems in Technology	3

Energy, Power, and Transportation (12 semester hours)

Engines and Power Train Technology	3
Power and Transportation Technology	3
Electronics II	3
Energy Elective (chem, physics, or engineering)	3

Of the 47 semester hours required for the major, 34 semester hours are delivered by technology education faculty.

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[1]The faculty in the Technology Education Program are concerned because Production, Communication, and Transportation are not totally inclusive of technology. Work is underway to expand or replace these organizers.

Professional Education Sequence. As noted earlier, a maximum of 18 semester hours in professional education coursework was mandated under the restructuring requirements. No minimum was set. The restructured program requires 17 semester hours as listed below:

Courses Taught by Technology Education Faculty

Introduction to Technology	3
Curriculum in Technology Education	3
Teaching Methods in Technology Education	3
Technology Education Practicum	3

Courses Taught by Curriculum and Instruction Faculty

Social Foundations of Education	2
School Learning	3

Under the restructured program, the number of courses taught by Curriculum and Instruction faculty was reduced from four to two while the number taught by Technology Education Faculty remained the same.

Clinical Experiences. Twelve semester hours of clinical experience are required in the restructured program:

Early Clinical Experience	1
Field Study	2
Student Teaching	9

Though the Early Clinical Experience and, of course, Student Teaching were requirements under the former curriculum, the field study component is new. The field study experiences are dispersed throughout the educational experience of the student through "logging" and documenting the requirements over time.

Program Structure

The program is nominally four years in length with the Bachelor of Science degree awarded to students who meet the graduation requirements. As previously mentioned, the degree will be granted by the College of Education. A 2.25 overall average is required for admission to Professional Studies which must occur after 60 semester hours have been completed. A 2.0 overall average is required for students who wish to transfer to technology education from another curriculum within the University.

Active recruit efforts have been focused on transfer students. Ongoing collaboration in this regard is in place with the College of Arts and Sciences and the Counseling Center. Minimal recruitment success has been achieved through direct efforts with high schools. Limited success has been achieved through community college contacts.

The Change Process

Why Programs are Being Changed

With the advent of the educational reform movement in the early 1980s, the nation's schools were undergoing massive change. In many instances, this change was fueled by the political environment of the times to "meet the rising tide of mediocrity" in the schools. In March 1986, Governor Baliles appointed a 17-member Commission on Excellence in Education that was specifically charged to develop a plan for putting Virginia first in rank in educational quality. One of the recommendations contained in the Commission's report, "Excellence in Education: A Plan for Virginia's Future," called for a complete revision in the way teachers are prepared in Virginia by July 1, 1992. In response to the Commission on Education report, the Board of Education has initiated many implementation activities. The recommendation encompassing the greatest and most significant change for teacher preparation is that of restructuring teacher education. The following excerpts from the report provided the basis for the restructuring guidelines:

> To bring about a real change in the way teachers are prepared in college, the undergraduate degree in teacher education should be abolished. The first requirement for teachers in Virginia must be that they are broadly educated in the liberal arts and thoroughly prepared in the subjects they will teach.
>
> This degree should not be simply a traditional arts and sciences bachelor's degree that includes a few education courses. The four-year curriculum for students preparing to teach should consist of the greatest number of courses in the arts and sciences which can be included feasibly and some specially developed education courses. Students earning a degree in an arts and sciences discipline should have an opportunity to meet the state requirements to be certified to teach.
>
> Universities may develop new kinds of four-year programs to prepare teachers or five-year or six-year programs with more extensive preparation in arts and sciences and in professional education.

To provide direction for the restructuring process, the Board appointed an Ad Hoc Committee on Teacher Education, consisting of three members of the Board of Education and three members of the State Council of Higher Education. Since July 1, 1987, committee members have worked with Department of Education personnel and the faculty and administration from teacher preparation institutions to implement the commission's recommendation.

Nine guidelines for proposals from university departments for restructuring were developed as follows:

1. The proposal should consider recent teacher education reform reports and must have a research base for content, design, and instructional practices.

2. The proposal must be designed in collaboration with institution faculty members and local school division personnel. It must include an ongoing process for collaborative planning, development, implementation, and evaluation.

3. The proposal must describe a teacher education program that will develop knowledge and competencies in general studies, professional studies, field experiences, and arts and sciences or disciplines appropriate to the endorsement being sought. Definitions and rationales for each area shall be developed in the restructured proposal submitted by the institution.

4. The proposal must require that prospective teachers meet institutional requirements for degrees in the arts and sciences or disciplines appropriate to the endorsements being sought.

5. The proposal must include specific plans for the recruitment and retention of minority students. In addition, it should include strategies for attracting academically talented students into the teacher preparation program. Implementation of this guideline should be developed within the institution's established recruitment and retention policy.

6. The proposal must incorporate specific entrance, retention, and exit criteria and include plans for frequent and systematic monitoring of student progress throughout the teacher preparation program, including the National Teacher Examinations (NTE).

7. The proposal must be limited to 18 hours of professional studies coursework, not including field experiences. A proposal exceeding the 18-hour limit for the bachelor's degree will not be accepted without a clear and convincing rationale.

8. The proposal must provide a continuum of field experiences ranging from observation to direct instruction in student teaching. These experiences must complement professional studies coursework.

9. The proposal must include a process for annual evaluation of the teacher preparation program and systematic follow-up of its graduates, including performance on the Beginning Teacher Assistance Program (BTAP).

Conceptual proposals for restructured programs were received from 36 institutions by January 4, 1988. A preliminary progress report prepared for the Governor in January identified several key issues to be resolved prior to submission of the final plans on May 4, 1988: further clarification of the apparent overlap between general studies coursework, professional studies coursework, and field experiences; more convincing justification for endorsements not requiring an arts or sciences degree; specific rationale and justification for those plans that proposed to exceed the recommended 18-hour limit on professional studies coursework; and specific plans and timelines assuring total involvement of the institution in the restructuring process.

Final plans were reviewed by a panel of national experts, and recommendations for approval or denial will be forwarded to the Board of Education and the State Council of Higher Education in May 1988. Final approval was scheduled in August, 1988. Institutions must implement their restructured programs by July 1, 1990.

How Changes are Being Made

The preceding mandates outlined above were sent to the various presidents in all universities preparing teachers in Virginia. These were sent to the various deans responsible for administering educational programs. In turn, the deans forwarded the mandates to their respective department heads and faculty in various educational programs.

In the case of the technology education area at Virginia Tech, the faculty began working in the fall of 1987 on their responses to the restructuring mandates from the ad hoc committee at the state level. By December 15, 1987, a conceptual proposal was submitted by the faculty in technology education to its dean and then all of the proposals for the various programs in the college were all forwarded to the state by January 4, 1988. Based on revisions of the conceptual proposals, final restructured plans were submitted to the state by May 4, 1988. The technology education program at Virginia Tech received final approval to its restructured plan in August 1988.

Degree of Acceptance in the University, College, Department and Faculty

Overall, there appears to be acceptance by the university and college, as well as the technology education faculty.

The Major Impacts

Impact on Teacher Education. On the short term, the effect of the restructuring initiative on the technology education program itself ranged from neutral to positive. It is neutral in that no undesirable changes in the existing program were forced. On the positive side, the short timeline of the initiative forced a lessening of the usual high level of scrutiny that typically occurs as proposed changes move through the University governance system. This allowed some positive changes to be implemented that many not have been possible under normal conditions. Ironically, the short timeline also prohibited a thoughtful, large scale curriculum revision.

On a long term basis, a disadvantage of the restructuring could result because technology education will be only one of four undergraduate degree programs in the college. Being a minority program and also one that requires a relatively significant proportion of the resources of the college may lead to potential problems.

Impact on University Faculty. Like the impact on the overall program, no short term impacts upon the faculty are anticipated. In the long term, however, the college no doubt will increase this and place more value upon graduate education. By virtue of this, faculty associated with

one of the few undergraduate programs in the college may face difficulties with tenure and promotion simply because their job expectations and day-to-day activities differ from the majority of the faculty in the college.

Impact on University Students. Again, due to the unique status of the program within the college, a loss of identity of the program within the larger University may occur. Hopefully, this can be prevented through overt action on the part of the faculty to promote the program and disseminate information about it throughout the University.

Impacts at the Secondary and Post-Secondary Level

It appears as though the restructuring initiative will result in a better-prepared teacher for the secondary schools. The net result, in the opinion of the faculty, is that it provides both greater depth, greater breadth, and more opportunity for interdisciplinary experiences for the prospective teacher. This advantage is realized, however, by virtue of the fact that technology education was exempted from the "degree in an art or a science" imposed upon most of the other teacher education programs within the college. If the exemption had not been granted, the results would have been devastating.

The Impact of the Holmes Group Recommendations on Industrial Teacher Education at Texas A&M University

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Texas A&M University has long been a leader in the preparation of teachers of industrial education. The Department of Industrial Education moved from the College of Engineering to the newly-formed College of Education in 1969. Industrial technology, engineering technology, and industrial distribution programs which were in the Department of Industrial Education, remained in the College of Engineering, which formed the Department of Engineering Technology to house them.

The Pre-Holmes Industrial Teacher Education Program

The undergraduate degree in industrial education includes majors in industrial arts education and vocational industrial education; there is also a degree in technical education. Though these programs are relatively traditional by most measures, they have been revised periodically to remain in the mainstream of industrial teacher education.

Like all teacher education programs at Texas A&M University, the industrial teacher education programs have admission standards considerably above overall university requirements. The curricula require a substantial general education component, including science and mathematics. In addition, there is a strong emphasis upon the development of technical competence, and a requirement for occupational competence in the programs preparing vocational industrial and technical teachers.

For many years, enrollments in the industrial teacher education programs have been relatively small; they have declined in recent years at a rate which appears to reflect state and national trends. By most measures, the undergraduate programs at Texas A&M University have been near the mean for industrial teacher education programs throughout the country.

Industrial arts graduates seeking certification have scored near the top on the ExCET (Examination for the Certification of Educators in Texas).

Teacher Education Requirements in Texas

The recommendations of the Holmes Group comprise only one of several sets of guidelines which have combined to effect dramatic changes in teacher education at Texas A&M University. Senate Bill 994 and other Texas legislative provisions have mandated several program features. Rules, regulations, and decisions of the Higher Education Coordinating Board and the Texas Education Agency have exerted direct influence upon the latitude of program design available to the faculty in the College of Education.

The Texas institutions in the Holmes Group (Baylor University, Texas A&M University, Texas Tech University, University of Texas at Austin, and Trinity University) evolved a complex model incorporating their recommenda-

tions for teacher education in Texas. Their "Integrated-Sequential Instructional Organization for Teacher Education," which is reproduced as Figure 1, presents a scheme for emphasizing professional education in the fifth year, pre-service program, prior to the induction year. The model also provides for the continuing education of teachers to implement a "Career Ladder" program in Texas.

Senate Bill 994

Senate Bill 994, which went into effect during the summer of 1987, mandated major changes in teacher education in the state. These included:

1. A requirement for an undergraduate degree in an academic discipline other than education or an interdisciplinary major related to the Texas public school curriculum.

2. A limitation of 18 semester hours for undergraduate certification course requirements in education, including student teaching.

3. An induction year (the first year of teaching following the successful completion of all program and certification requirements, including student teaching) supervised by experienced teachers, school administrators, and higher education faculty.

4. Institutional accreditation of teacher education programs is linked to performance of teacher education students on the statewide entry and exit examinations (PPST and ExCET) and evaluations of beginning teachers on the Texas Teacher Appraisal System during the induction year.

Guidelines on Teacher Education in Texas

The Higher Education Coordinating Board approved new guidelines for teacher education at its October 28, 1988 meeting. These guidelines clarified Coordinating Board positions on a number of issues related to the types of programs which could be approved.

In one major clarification, the Coordinating Board moved to require institutions providing certification programs to make initial certification available as a part of undergraduate degree programs:

> Every public institution offering teacher preparation programs must offer the eighteen hours of professional development at the undergraduate level as part of all undergraduate degree and initial (entry) certificate programs offered. (Coordinating Board, October 28, 1988, p. 1)

Guidelines were also approved at the October 28, 1988 meeting for two types of certification programs requiring baccalaureate degrees for entrance. One of these, the "Post-Baccalaureate," is for individuals who enter teacher education with the bachelor's degree but who did not complete one of the approved undergraduate initial teacher certification programs in the institution. The Coordinating Board guidelines require that these

post-baccalaureate students must complete their initial certification requirements in courses offering undergraduate credit. (Presumably these would be the same courses required in the undergraduate certification program). Graduate level teacher certification courses may be offered to post-baccalaureate certification students only for certification beyond the entry level, must require undergraduate prerequisites, and must differ significantly from the undergraduate counterpart courses.

The second option for graduate students is designated "Extended Certification Preparation." The term reflects the requirement:

> Students must be provided a choice to become certified without taking the extended program, through a baccalaureate certificate in the same specialization or teaching field in which an extended program is offered. (Coordinating Board, October 28, 1988, p. 2)

Thus the Coordinating Board actions apparently make it impossible for an institution to require its teacher education majors to complete a baccalaureate degree before entering teacher education. At this writing, however, the profession is awaiting interpretations of the new policy guidelines.

The Post-Holmes Teacher Education Program at Texas A&M University

The 1987-1988 academic year saw a flurry of activity as the College of Education sought to review all teacher education programs, revise requirements, develop new courses, and seek approval for degree programs and certification patterns.

Program Philosophy

The College of Education has determined that its mission is to concentrate upon the development and operation of rigorous, innovative teacher education programs. As programs were examined and revised, every attempt was made to see that they provide top-quality teacher preparation. Mandated requirements were considered only as minimums. It is the expectation of the faculty and administration of the College of Education that Texas A&M programs will be exemplary in every way.

Program Components

This section presents the components of the teacher education programs at Texas A&M University as these have been developed by interdisciplinary groups within the College of Education and as the programs were approved by the Coordinating Board at their October 18, 1988 meeting.

General Education Component. In a development which began on the campus several years before the Holmes Group was formed, university-wide core curriculum requirements have been revised under the leadership of the Faculty Senate. These provisions, which are now in effect, increased general education requirements in most teacher education programs.

Major Coursework. All initial secondary education certification programs require an academic major outside education. Students seeking initial certification in elementary education may pursue a major outside education, or they may choose to pursue an interdisciplinary baccalaureate elementary education program including 24 hours in a major (chosen from English, mathematics, reading, science, and social studies) and 12 hours in each of the other four areas.

Professional Education Sequence. Secondary education initial certification candidates are required to complete 22 hours of undergraduate courses, including student teaching.

Clinical Experiences. In addition to the student teaching completed as a part of the initial certification program, an induction year is required of beginning teachers.

Industrial Teacher Education in the Post-Holmes Era

Industrial teacher education programs at Texas A&M University were not revised during the 1987-1988 academic year. Instead, an administrative decision was made outside the department to terminate the existing baccalaureate degree programs in industrial education and technical education, effective August 31, 1991. As a consequence, the faculty of the Department of Industrial, Vocational and Technical Education did not participate actively in the revision process which pervaded the other teacher education groups. The department was, however, represented on the committees which considered the other program proposals.

Recently, the department has been given the opportunity to proceed with the development of proposals for certification programs. Work is beginning during late 1988 to seek an approach for re-establishing industrial teacher education programs which will fit within the newly-approved institutional pattern and meet the recently adopted Coordinating Board guidelines.

Location and Type of Degree. It is not yet clear where undergraduate degrees needed for initial certification are most likely to be obtained. Possibilities include the Department of Engineering Technology, which has several undergraduate options which might provide background for industrial teacher education, the Department of Construction Sciences, and the Department of Agricultural Engineering, which has a Mechanized Agriculture option.

Both the Master of Education and the Master of Science are available within the department's approved programs. However, since current Texas certification regulations do not mandate that the master's degree be completed, it is possible that the graduate professional education coursework required for extended certification or post-baccalaureate certification programs might not necessarily lead to the master's degree. It seems most likely that master's degree requirements would be developed which would build upon graduate certification requirements, the pattern which characterizes the secondary certification programs at Texas A&M.

Recruitment Strategies - Recruitment for the extended certification program will focus upon students in Texas A&M departments with relevant undergraduate initial certification majors on the College Station campus. In addition, modest recruitment efforts could be directed toward other Texas institutions which have undergraduate programs in industrial technology and related fields.

The Change Process

To date, the only official change in industrial teacher education at Texas A&M University has been the administrative elimination of undergraduate degree programs. The faculty of the department did not support the elimination of the undergraduate programs. When they were informed that the undergraduate teacher education program could not be retained, the departmental faculty sought but did not receive the opportunity to develop an undergraduate non-teaching major which could have provided a major for initial certification and a nucleus of prospective students for an extended certification program.

The department did not receive administrative approval to proceed with the development of revised industrial teacher education programs until all other programs in the College of Education had completed the long revision process involving many faculty committees, after the massive group of program revisions had been approved by all on-campus agencies, including the Faculty Senate, and after the program revisions had been submitted to the Texas Education Agency and the Texas Higher Education Coordinating Board. Consequently, exploratory discussions, even among the departmental faculty concerned with industrial teacher education, did not begin until late fall, 1988. To date, there is obviously little progress in the development of proposals for industrial teacher education programs which would be feasible within the constraints imposed by the state and the institution.

Degree of Acceptance Within the University, College, Department, and Faculty

There is wide variation in levels of acceptance of the proposed changes. While the departmental faculty does not support the elimination of the undergraduate degree programs, they now appear to be ready to initiate a good-faith attempt to respond to the challenge to develop industrial teacher education programs within the newly-approved institutional pattern.

Positive and Negative Aspects of the Change Process

It is still much too early to assess the outcomes of the change process itself. On balance, however, present faculty assessments of the effects of the changes and the processes followed are predominantly negative.

It is difficult to separate the negative effects of the lack of involvement in the College-wide reform response from the other factors in the current situation. Though it seems unlikely, it may be that this institutional exclusion reflected the exclusion of considerations of industrial teacher education programs within the basic frame of reference of the Holmes Group.

The Major Impacts

Impacts of the developments in industrial teacher education at Texas A&M are addressed in the areas assigned by the symposium organizers.

Impacts on Industrial Teacher Education Programs

Current undergraduate programs will be phased out no later than August, 1991. Development of proposals for new industrial teacher education programs and obtaining approval of them will require a substantial period of time, after which recruitment and start-up procedures must be implemented.

Impacts on University Faculty

In the future, the entire teaching and advisement assignments of the departmental faculty will be in graduate study. This is not a major shift, since most faculty members have devoted the greater portion of their efforts to graduate teaching, research and advisement. To quote the current Undergraduate Catalog: "The elimination of the department's undergraduate degrees in industrial education and technical education results from new state-mandated requirements and a shift of resources to further advance the department's nationally recognized graduate programs" (1988, p. 203).

Impacts on University Students

Current undergraduate students are obviously directly affected. The cancellation of the major in one's chosen field will almost certainly be accompanied by some negative outcomes. All currently enrolled students have developed formal degree plans which will be completed prior to September 1, 1991. Students who could not complete their degree requirements prior to that time have been encouraged to transfer to other majors at Texas A&M University or to transfer to industrial teacher education programs at other institutions. No new students or transfer students are being recruited or accepted.

Future graduate students will not have opportunities to teach undergraduate majors within the department, an experience which has traditionally been viewed as an important component of professional preparation for teacher educators. However, future graduate students will continue to have the opportunity to compete for assistantships teaching undergraduate technical courses in Engineering Technology and Engineering Design Graphics.

Also, the department is developing and field testing two undergraduate courses to serve majors from other departments. One of these courses, INED 302, Technology, Resources and Society, was proposed for inclusion in the revised core curriculum requirements for all undergraduate students at Texas A&M University. The general requirement in this area, while recommended by the Faculty Senate, was not approved by President Frank Vandiver. The new course still has some potential appeal as an elective for students across the university.

The second course, Technology for the Elementary School, is being taught as an elective for elementary education majors. If this endeavor is successful, it may retain undergraduate teaching opportunities for graduate students within the department.

Graduate students will continue to have access to fellowships, research assistantships, and other non-teaching appointments, both within the department and in other departments on campus.

Impacts on Industrial Education at the Secondary and Post-Secondary School Levels

An obvious result of the curtailment of industrial teacher education programs at Texas A&M University is a reduction in the number of teachers graduating from the department. Operation of a teacher education program automatically includes considerable interaction between the university and the schools in such areas as field experience and in the placement of graduates. As that interaction is phased out, the public schools will not have the informal, automatic access to faculty expertise which normally characterizes those transactions.

Summary

It is obvious that the industrial teacher education program revisions at Texas A&M University will not be completed for some time. In the interim, the programs are coping with the combined impact of the Holmes proposals and changing state and institutional requirements. It remains to be seen whether the faculty can develop viable industrial teacher education programs within the constraints outlined in this paper. On the one hand, the prognosis is good for the development of new industrial teacher education programs which will be stronger than the pre-Holmes programs. However, any new programs must be developed and initiated without a strong continuing program of undergraduate certification and degree programs.

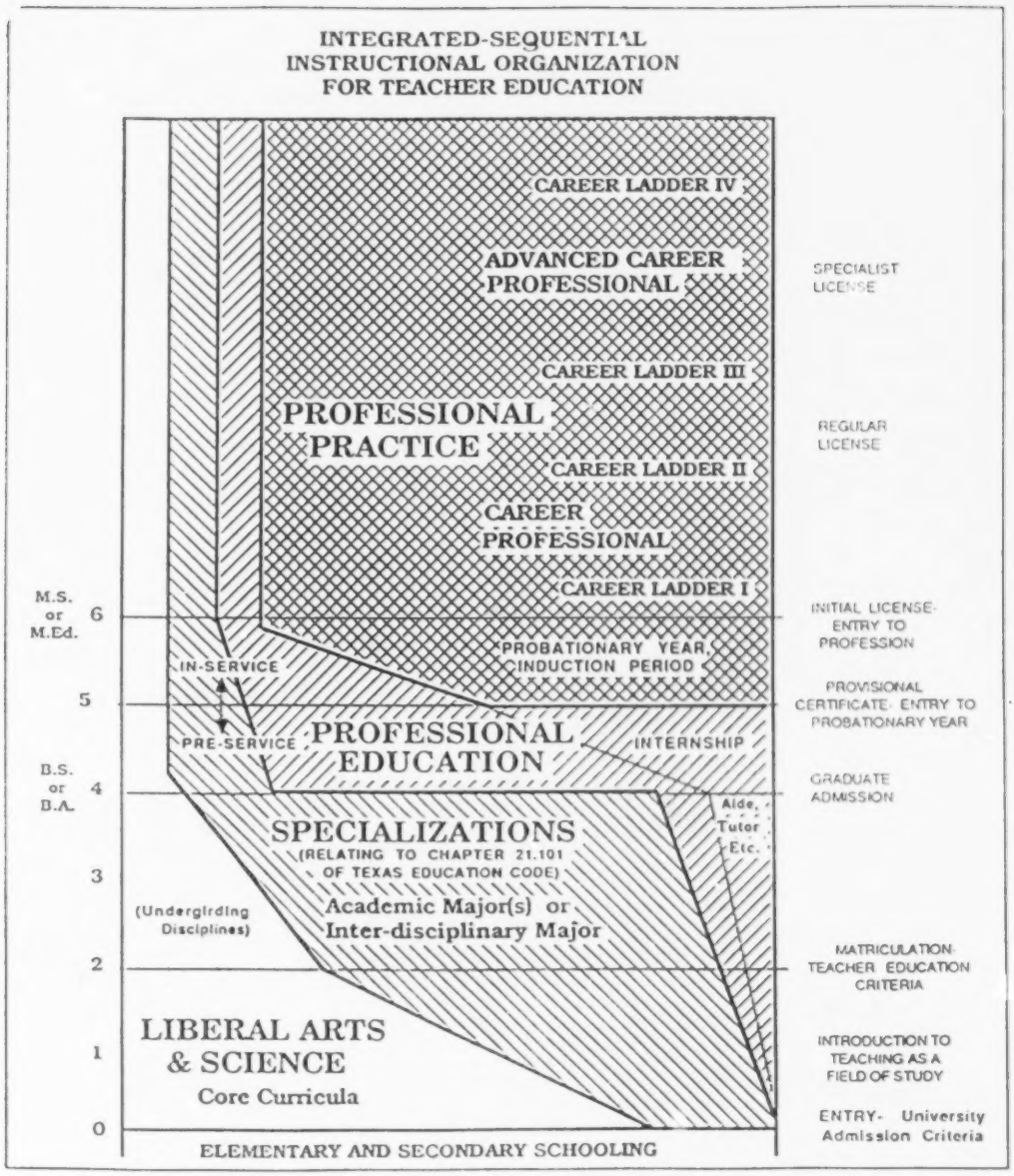

Figure 1. The Texas Holmes Group Model: Integrated-Sequential Instructional Organization for Teacher Education.

Technology Teacher Education Proposal with Special Consideration for Career Patterns

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This proposal should be interpreted as the authors attempt to address Technology Teacher Education from the perspective of career patternsand to outline a program which is consistent with the Holmes Group goals. Consideration of career patterns is essential if non-traditional students are to be attracted to these programs and if the program is to meet the diverse needs of individuals who possess varied backgrounds upon entry. Assuming that Holmes member institutions eliminate certification st the bachelors degree , then it will be necessary to recruit teachnology teachers form a variety of sources to sulfill the demand.

Alternate Career Patterns

In addition to the Holmes Group and other efforts to give direction to teacher education reform other evidence suggests that the individuals entering teacher education programs are not now and are less likely in the future to be the typical 18-19 year old high school graduate. We already enroll substantial numbers of individuals who have previous business experience, industrial employment, military experience, or who have previously earned college degrees in fields other than technology teacher education. By changing teacher education to primarily a post-baccalaureate program it is entirely likely and very desirable that individuals with even greater variation in background will be recruited. Figure 1 presents a model of the alternative career patterns which seem likely to lead to a career in technology education. This model suggests that formal instruction in technology would be common to all students through the middle grades. At the high school level students would have the opportunity to pursue programs designed to prepare them for college and to complete at least two one-year courses which are technical in nature. The opportunity to enter the workforce or the military upon graduation from high school should be seen as a viable educational experience and not as detours. For many students these opportunities provide valuable experience, technical knowledge and skill, maturity, and the resources necessary to pursue a college education.

Entry into a technical institute or a four-year college may follow immediately after high school. For those students who lack previous business/industry experience, a business/industry internship should be a mandatory part of their program. The two-year technical institute graduate may enroll in four year technology program to complete the liberal and technical education program necessary to enter the M.Ed. program. During the undergraduate program an introduction to education option would provide basic pedagogical skills and involve students in a variety of clinical and field experiences. These experiences would provide students with opportunities to explore education as a career and engage in the selective admission process.

Expanding briefly on the type of bachelors degree program which is most appropriate to a technology teacher reveals a major problem of matching present undergraduate programs with the needs of technology teacher education. Many institutions offer four year degree programs in industrial or engineering technology which will be inadequate for the needs of technology teacher education. A later section of this paper presents a proposal for the technical component of the undergraduate general technology degree program. Review of that program will reveal that breadth of technical background is valued. Therefore, individuals who have completed specialized industrial/engineering technology programs will find it necessary to expand their technical background before they complete the M.Ed. program.

Following completion of an undergraduate degree, future technology teachers may choose business/industry employment, military service, employment as a teacher aid or direct entry into the technology teacher education program. In order to attract the quality candidates we need to become teachers, several means of financial support will be necessary. In addition to scholarships, fellowships, and continued part-time employment as a teachers aid; teaching and research assistantships will be highly desirable. These forms of employment not only provide financial support for the students but they provide valuable professional experiences.

The program is conceived as a two year program which focuses on pedagogy and includes extensive clinical and field experiences. During the second year of the M.Ed. program the candidate would engage in a paid internship in a professional school which is affiliated with the university. The candidates' work would be closely supervised by a clinical professor. A masters project would be completed during this year which is directly related to the internship experience and is likely

to focus on analysis of the candidate performance related to appropriate theory of educational practice.

Beyond the M.Ed. and certification, the opportunities for professional advancement includes becoming a master teacher, a clinical professor, or an academic professor.

Reviewing the model suggests that the individuals entering technology teacher education programs will: (1) possess a wide range of experiences, (2) vary in the amount and depth of technical training they have completed, (3) vary in age, and (4) vary in the amount of teaching related experiences which they possess. These factors suggest the need for a highly flexible teacher education program which recognizes previously developed competencies and provides individually tailored programs both to remediate deficiencies and to develop pedagogical skills which are grounded in sound educational theory.

An earlier draft of this career development scheme focused on institutional cooperation in the delivery of technology teacher education (Blankenbaker, 1988) and therefore, these issues shall be avoided in this paper.

Undergraduate Program

Recent development at Ohio State have caused us to rethink the undergraduate program which we believe to be most appropriate to the preparation of technology teachers. A revision of the basic education requirement (BER) is currently being considered for adoption which would increase the BER from 45 quarter hours to as much as 110 hours. Obviously, this is cause for concern given the fact that the maximum requirement for a B.S. or B.A. will be retained at 190 or 196 quarter hours. The program outlined in this section meets these criteria but it also reduces the technical coursework below the level desired. In presenting this program I have chosen to omit the extensive rationale for each of the components of the program believing the audience for this presentation is sufficiently versed in the philosophical background of our field and documents such as A Curriculum to Reflect Technology, The Ohio Prospectus, A Rationale and Structure for Industrial Arts Subject Matter, The Jackson's Mill Industrial Arts Curriculum Theory, and Ohio's Industrial Technology Systems Handbook to understand what technological content is encompassed in the four categories: (1) Communication, (2) Construction, (3) Energy/Power/Transportation, and (4) Manufacturing. Expanded course titles have been utilized to assist the reader in understanding the content of the major.

Basic Education Requirements

Foundations

1. Reading, writing, speaking, and critical analysis * Freshman Level - first course * Sophomore Level - second course * Junior/Senior Level - third course (May be taught as a part of the major)	9-15 hrs.
2. Quantitative and logical skills (Mathematics Placement R) Mathematical and Logical Analysis Data Analysis	6-10 hrs.
3. Foreign Language (Placement Testing)	6-20 hrs.
Natural Science One or possibly two general technology courses may count toward this requirement	12-20 hrs.
Social Science	9-15 hrs.
Arts and Humanities Two courses in American history Three courses aimed at a close analysis of text and works of art	15-25 hrs.
Capstone Experience Integrative contemporary issues (May be taught within the major)	3-5 hrs.

Technology	**Major**	(74-77 hrs)	
CIS	211	Computer Programming for Problem Solving	5 hrs.
EDUCSTDS	1xx	Technology and Society	5 hrs.
EDUCSTDS	220	Design of Manufactured & Constructed Goods	3 hrs.
EDUCSTDS	221	Manufacturing Practices I	4 hrs.
EDUCSTDS	222	Manufacturing Practices II	5 hrs.
EDUCSTDS	224	Mechanical Systems and Servicing	4 hrs.
EDUCSTDS	225	Transmission and Utilization of Mechanical Power	4 hrs.
EDUCSTDS	227	Electrical Systems and Servicing	4 hrs.
EDUCSTDS	228	Electronic Systems and Servicing	4 hrs.
EDUCSTDS	231	Construction Practices I	5 hrs.
EDUCSTDS	232	Construction Practices II	5 hrs.
EDUCSTDS	235	Graphic Reproduction Practices	4 hrs.
EDUCSTDS	236	Printing and Publishing Practices	4 hrs.
EDUCSTDS	250	Work Experience in Industry	3-6 hrs.
EDUCSTDS	355	Custom Production	4 hrs.
EDUCSTDS	694	Microcomputer Applications in Technology	4 hrs.
EN GRAPH	121	Graphics Presentation	3 hrs.
EN GRAPH	204	Technical Drawing	3 hrs.
BUS ADM	630	Introduction to Prod. & Org. Mgn	4 hrs.

Options (12 hrs.)
Introduction to Education Option -12 hrs:

ED-T&P	450	Professional Introduction I (includes field experience)	4 hrs.
ED-T&P	451	Professional Introduction II (includes field experience)	4 hrs.
ED-P&L	694.46	Computer Application in Education	4 hrs.

Technical Elective Option - 12 hrs:
More than 25 courses have been identified which would enhance the graduates' technical expertise.

Upon successful completion of the undergraduate program students will be eligible to apply for admission to the M.Ed. technology teacher education program. Applicants with technical backgrounds different from that outlined in the undergraduate program will be required to make-up these deficiencies either before entry into the M.Ed. program or in conjunction with the program. In cases when the skills and technical knowledge may have been acquired outside formal education, individual assessments will be made to ascertain the applicants achievement. In all likelihood, many of the students enrolled in the M.Ed. program, who graduated from institutions other than OSU, will also be required to complete a few undergraduate technical courses to broaden their technical background. Also, students who have not previously completed the Intruduction to Education option will be expected to prior to entry into the MEd program.

Master of Education Program

Teacher education reform doesn't in itself create any new knowledge of teaching practice. It may provide an opportunity to implement the best we currently know about educational practice and it may provide a basis for extending our knowledge of practice. It is these opportunities which provide the probability for enhancing Ph.D. programs and increasing the scholarily productivity of faculty members.

It is the contention of this author that the professional content for our majors may be organized as illustrated in Figure 2.

The intent is to suggest that the content areas all have contributions to make to the strands. Inversely, the strands should be foci for the content areas. Additionally, each of the content areas or strands must be studied from both the broad perspective of education and the specialized needs of the discipline. Thus, it is possible to organize general methods courses which explore the content areas and strands at a general level. This level of understanding must be achieved as a result of the Introduction to Education option which is a part of the undergraduate program. And, it is also necessary to study the same concepts on the level of the discipline.

Further, it is the contention of the author that low level cognitive understanding is totally insufficient. In fact, it will be essential to provide structured practice for each of the major concepts taught if teacher education reform is to impact teaching practice. The initial experiences must be conducted in a clinical setting which provides controlled conditions, feedback, analysis, and integration with educational theory. Once the initial learning of the concept/skill has been achieved, practice in a less controlled field setting will be necessary. Again, feedback, evaluation, and synthesis of the experience will enable students to maximize the benefits of practice.

The clinical/field component will consume much of the students time during the first year of the M.Ed. program. As a guideline, it is suggested that approximately 50% of the student's time be allocated to preparation for, analysis of, and synthesis of practice.

Previous comments have alluded to the centrality of theory in the proposed M.Ed. program. "War stories," "cookbooks," and "antidotes" are insufficient to equip teachers for professional practice. While the evolution of educational theory has been slow, progress has been made. It is essential that a theory of professional practice be codified and taught in a manner which will enable future teachers to make effective

use of what is already known and establish a framework for their continued professional development.

This need to establish a theoretical base for professional practice represents an opportunity for enhancement of scholarily activity on the part of faculty and advanced graduate students. Careful planning and commitment to a program of research which is integrated with the teacher education program can yield positive results for the teachers being trained, the advanced graduate students, and the faculty. These goals will be achieved as a result of the delivery system which is employed. Figure 3 lists the courses which are currently proposed to meet the MEd degree requirements and result in certification.

Returning to the career patterns perspective and attempting to place myself in the position of the prospective candidate who may consider technology teacher education as a career yields a complex picture and significant expansion of pre-employment education.

The typical 18-19 year old college freshman who enrolls in the technology undergraduate degree program and selects the technology education option could complete the MEd program including full professional certification in a total of six years. This represents a two year increase in pre-employment education. However, it should be noted that provided the sixth year is a paid internship, the financial burden can be substantially reduced. Additionally, assistanships can be expected to assist some students during the fifth year. However, the number of these positions available will be directly dependent upon the number of undergraduate technical courses which are retained. Possibly the biggest disadvantage to the candidate who enters the teacher education program via the shortest rout is the absence of experience and maturity which may be gained through full-time employment and/or military experience.

Individuals who choose a technical institute or a "non-Holmes" four institution and then transfer to a Holmes Technology Teacher Education program face several additional barriers, all of which can be translated into additional educational preparation. To the extent that their technical background is insufficiently broad, they will be expected to complete additional technical coursework. While it is impossible to predict accurately how this requirement may translate without reviewing a specific transcript, it is doubtful that fewer than 20 or more than 40 quarter hours of additional coursework would be necessary. In addition, the 12 hour education optiopn would be

required. This suggests the addition of a minimum of two and possibly as many as four additional quarters to complete the program. Articulation agreements with other insititutions could reduce this requirement significantly provided that the individual makes a decision to pursue technology teacher education early in their undergraduate program.

A major concern about the transfer student remains unanswered at OSU. Should the proposed general education be adopted, the transferability of coursework completed at other institutions may become questionable. This is potentially a major problem and could make it very difficult to attract students form technical institutes or other universities.

Individuals who have employment or military experience may be able to significantly reduce the technical component of their undergraduate program either by transferring credit earned in the military or by taking special examinations which result in credit being given for previous experience. Obiviously, if these individuals enrolled in a technical institute and/or a non-Holmes college prior to entering the Technology Teacher Education program, their program wjould suffer form the same shortcomings as other members of that group.

Summary

Approximately two years ago a proposal was drafted to create an undergraduate general technology degree program which would be a pre-requisite to the Holmes technology teacher education program. At that time the focus was of enhancing the technical background of the candidate. This was achieved by postponing nearly all of the professional education courses to the graduate level. The next step was to outline what was believed to be a model technology teacher education program. Simultaneously the university general education requirements were reviewed and a proposal to increase this requirement from 45 to 110 quarter hours is now being considered for approval. Should the 110 quarter hour general education requirement become a reality, it will be impossible to meet certification requirements within the 196 quarter hour limit for the bachelors degree. Therefore, a pesimist could suggests that a Holmes model program could be produced by simply converting the existing undergraduate professional courses to graduate courses and delaying the awarding of the provisional certificate until the MEd is completed. Opposition to the 65 hours increase in the general education requirement has been expressed and we continue to seek resources to

implement a clinical/field based teacher education program. Should both of these efforts fail, it is doubtful that anything of significant value will result from teacher education reform at Ohio State.

Figure 1
Career Development Pattern for
Technology Teachers

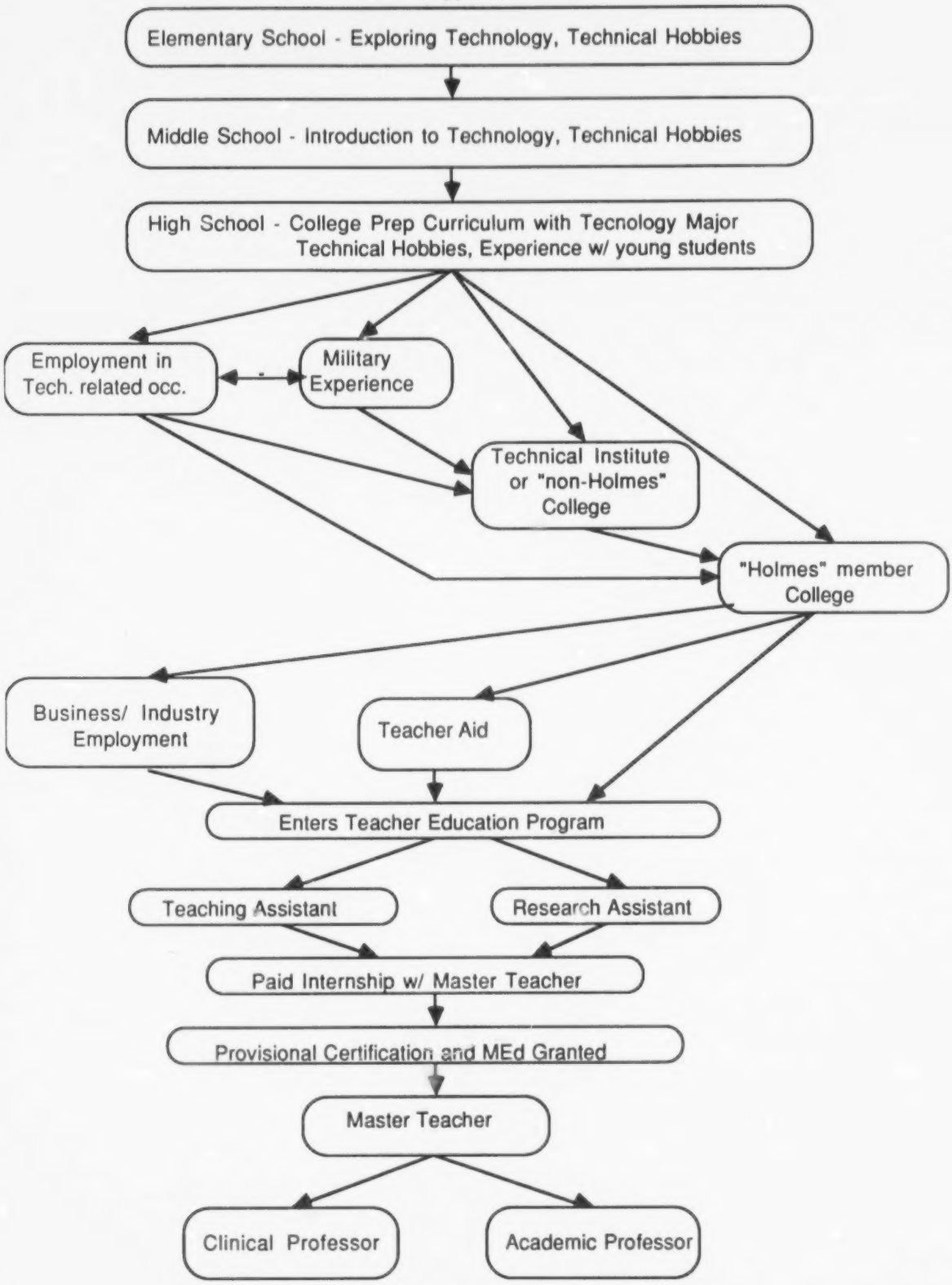
Elementary School - Exploring Technology, Technical Hobbies
Middle School - Introduction to Technology, Technical Hobbies
High School - College Prep Curriculum with Tecnology Major
Technical Hobbies, Experience w/ young students
Employment in Tech. related occ.
Military Experience
Technical Institute or "non-Holmes" College
"Holmes" member College
Business/ Industry Employment
Teacher Aid
Enters Teacher Education Program
Teaching Assistant
Research Assistant
Paid Internship w/ Master Teacher
Provisional Certification and MEd Granted
Master Teacher
Clinical Professor
Academic Professor

Figure 2
Professional Component of the Technology Teacher Education Program

	STRANDS			
Content Area	Multi-culture	Reading in the Subject Field	Classroom Management	Special Needs Students
History & Philosophy	x		x	
Organization & Administration of Schools	x		x	x
Curriculum	x	x	x	x
Instruction	x	x	x	x
Evaluation	x	x	x	x
Psychology of Education	x	x	x	x
Sociology of Education	x	x	x	x

Figure 2
M.Ed. Program

Quarter	Courses	Quarter Hours
1	* History and Philosophy of Technology Education	4
	* Technology Education Curriculum	4
	* Seminar	1
	* Planning and Preparing Media	3
2	* Multicultural Education	3
	* Educational Research	3
	* Teaching Strategies for Technology Education	5
	* Seminar	1
3	* Technology Education Program Development for Educationally Disadvantaged and Handicapped	3
	* Seminar	1
	* Evaluation	3
	* Foundations of Education	3
	* Elective	3
4	* Student Teaching/Seminar	15
5 - 7	* Classroom Research	3
	* Master's Project	9 - 12